

IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF GEORGIA  
ATLANTA DIVISION

DONNA CURLING, ET AL., :  
 :  
PLAINTIFFS, :  
vs. : DOCKET NUMBER  
 : 1:17-CV-2989-AT  
BRAD RAFFENSPERGER, ET AL., :  
 :  
DEFENDANTS. :

TRANSCRIPT OF HEARING ON PRELIMINARY INJUNCTION VIA ZOOM

PROCEEDINGS

BEFORE THE HONORABLE AMY TOTENBERG

UNITED STATES DISTRICT JUDGE

SEPTEMBER 11, 2020

8:16 A.M.

VOLUME 2

REDACTED

**MECHANICAL STENOGRAPHY OF PROCEEDINGS AND COMPUTER-AIDED**

**TRANSCRIPT PRODUCED BY:**

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UNITED STATES DISTRICT COURT  
OFFICIAL CERTIFIED TRANSCRIPT

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**P R O C E E D I N G S**

**(Atlanta, Fulton County, Georgia; September 11, 2020.)**

**(Witness sworn)**

THE COURT: All right. State your name for the record.

THE WITNESS: My name is Juan Gilbert.

THE COURT: Very good. Go ahead, Mr. Miller.

MR. MILLER: Thank you, Your Honor.

Whereupon,

JUAN GILBERT, PH.D.,

after having been first duly sworn, testified as follows:

**DIRECT EXAMINATION**

BY MR. MILLER:

**Q.** Dr. Gilbert, what is your current employment?

**A.** I am at the University of Florida where I am the current department chair of the computer and information science and engineering department. And in that position, I am also a full professor, endowed professor with tenure.

**Q.** Thank you. And can you walk us through your professional background and research in election systems and security?

**A.** Yes. In 2003, my lab built an open source voting system called Prime III. That is Prime Roman Numeral III. And that system was designed to have a universal implementation so that everyone independent of their ability or disability could use the same technology.

1 And we designed it to be useable, secure, and accessible  
2 all at the same time. And that system since 2003 has been  
3 through several pilots and elections as far as organizational  
4 elections. And I have had the opportunity to serve on -- serve  
5 as an expert for the United States Election Assistance  
6 Commission.

7 I served on a national academy committee on the future of  
8 voting. And we have done additional work in elections dealing  
9 with lines. That was more recent. We have done some work on  
10 voter ID, which isn't relevant here. But those are some  
11 highlights.

12 THE COURT: Dr. Gilbert, I think that there is some  
13 degree of feedback on your line. Is there any echo, or is  
14 that -- I can hear my own voice now.

15 THE WITNESS: I think that is someone else other than  
16 me.

17 THE COURT: We all are having an echo.

18 MR. MILLER: I was hearing that as well. It seems to  
19 have stopped.

20 THE COURT: All right. That is better.

21 All right. Go ahead.

22 **Q. (BY MR. MILLER)** Thank you, Dr. Gilbert. And as far as  
23 your education, what degrees do you hold?

24 **A.** I have a bachelor of science degree in systems analysis  
25 from Miami University in Ohio. I have a master of science in



1 computer science from the University of Cincinnati, and I have  
2 a Ph.D. in computer science from the University of Cincinnati.

3 **Q.** Thank you. And, Dr. Gilbert, prior to your position now  
4 at the University of Florida, have you held other positions at  
5 other universities?

6 **A.** Yes, I have. I started my career at Auburn University --

7 MR. CROSS: Your Honor?

8 THE COURT: I'm sorry.

9 MR. CROSS: I'm sorry, Your Honor. This is David  
10 Cross. Just for efficiency, Your Honor has his CV. If they  
11 want to propose a scope of expertise, we may be able to just  
12 cut to the chase.

13 THE COURT: Why don't we go ahead and do that.

14 MR. MILLER: That is certainly fine by me. We would  
15 admit Dr. Gilbert as an expert in election systems and  
16 security.

17 MR. CROSS: Election systems is fine. We object to  
18 security. But for the sake of the hearing, Your Honor, we can  
19 move on.

20 THE COURT: All right. Well, why don't we say  
21 election systems. And if you want to examine him further as to  
22 the defense with your experts during the course of your  
23 examination, you can address the issue of security.

24 MR. MILLER: Your Honor, I would request at that  
25 juncture to be able to redirect on that topic to the extent

1 that we're going to have a challenge on a scope or  
2 qualification issue after I complete.

3 And, of course, in the interest of efficiency, we can  
4 move beyond the background.

5 THE COURT: All right. Please do.

6 MR. MILLER: And I would just briefly like to mention  
7 to the Court one additional background point.

8 **Q. (BY MR. MILLER)** Dr. Gilbert, you were admitted as an  
9 expert in the case *National Federation of the Blind vs. Lamone*;  
10 correct.

11 **A.** Yes.

12 **Q.** Okay. And in that case, in fact, you were admitted and  
13 the Court discussed your qualifications in election systems and  
14 security. Do you recall that?

15 **A.** Yes.

16 MR. MILLER: And just for counsel and Your Honor, the  
17 Westlaw cite to that order is 2014 WL 4388342.

18 **Q. (BY MR. MILLER)** And so, Dr. Gilbert, you mentioned that  
19 you had served on a committee with the National Academies of  
20 Science, Engineering, and Mathematics; correct?

21 **A.** Correct.

22 **Q.** And was that -- that was the Committee on Future Voting;  
23 right?

24 **A.** Yes.

25 **Q.** I'm trying to recall your testimony accurately.

1 And did that committee produce a report?

2 **A.** Yes, we did.

3 **Q.** And what is that report titled?

4 **A.** I think Securing the Vote: American Democracy or  
5 something like that. I don't know it off the top. But I know  
6 Securing the Vote is how it begins.

7 **Q.** Sure. Okay.

8 THE COURT: What year was the report?

9 THE WITNESS: 2018, if I'm not mistaken.

10 THE COURT: And was -- was Dr. DeMillo on that  
11 committee with you? There were several people?

12 THE WITNESS: No.

13 THE COURT: There were several people in this case  
14 who had been on one of these or another of NSA, of the National  
15 Science Academy. I was trying to determine.

16 So you were on the committee, or was there a larger  
17 group that did -- was responsible for issuance of the other  
18 report?

19 THE WITNESS: It is just a committee that was  
20 responsible, and I was a committee member.

21 THE COURT: All right. Fine. Go ahead.

22 MR. MILLER: Your Honor, of course, the National  
23 Academy's report, Securing the Vote, we have discussed a number  
24 of times in this case. I know Your Honor recognizes it.

25 THE COURT: All right.

1 **Q.** (BY MR. MILLER) Dr. Gilbert, I'm going to just ask you a  
2 few questions without trying to comprehensively go back over  
3 your declarations in this case.

4 But for starters, you do recall submitting declarations in  
5 this case; right?

6 **A.** Yes.

7 **Q.** Okay. And those were two declarations; correct? One last  
8 year in the fall of 2019 and then this year?

9 **A.** Correct.

10 **Q.** Of anything in your -- contained in those declarations,  
11 has your opinion changed?

12 **A.** I don't think so, no.

13 **Q.** Without asking you whether you would prefer to put a comma  
14 somewhere else, but the thrust of it, that opinion has not  
15 changed?

16 **A.** Correct.

17 **Q.** Dr. Gilbert, can you talk to us a little bit about the  
18 similarities of BMD and hand-marked paper ballot voting  
19 systems?

20 **A.** The similarities are both yield a paper ballot that can be  
21 voter verified and from implementation both tend to be scanned  
22 by a separate machine. And then they have the ability to be  
23 audited by a third party. And those are the major  
24 similarities.

25 **Q.** And what about any differences between the two?

1     **A.**     There are differences. Hand-marked paper ballots are  
2     obviously marked by an individual by hand. Whereas, the BMDs  
3     are marked by the device.

4             Wow, there are a lot of differences. So some of the  
5     differences -- I think in my declaration I talk about  
6     undervotes and overvotes. Undervotes and overvotes are  
7     represented differently. On a hand-marked paper ballot, an  
8     undervote is a blank. And on a BMD, it says no selection or it  
9     can say there is nothing there. It can comment. And then  
10    overvotes are -- can be prohibited in a BMD, but you can't  
11    prohibit them in hand-marked paper ballots.

12            Those are some of the differences. But there are others.

13    **Q.**     And without, again, trying to go back over the entirety of  
14    your declarations, I know your research has a lot of focus on  
15    accessibility; is that correct?

16    **A.**     Yes.

17    **Q.**     And with respect to accessibility, do you have an opinion  
18    about the voting systems between hand-marked paper ballots and  
19    BMDs?

20    **A.**     Yes. Hand-marked paper ballots are not accessible. For  
21    people with disabilities, in particular those who are blind or  
22    visually impaired, they can't use those without assistance.  
23    Whereas, a BMD they can do so without assistance. That is a  
24    major difference.

25            I will also say a difference is hand-marked paper ballots

1 allow for ambiguous input, meaning the voter could write stray  
2 marks and do things that are ambiguous that require  
3 interpretation of an auditor or a third party. Where to my  
4 knowledge, that has never, ever happened with a ballot-marking  
5 device.

6 **Q.** I want to talk about a couple of things in your most  
7 recent declaration. You talked about a few studies regarding  
8 voter verifications of ballots.

9 Can you tell the Court about those?

10 **A.** Yes. There are some studies out there. One was done -- I  
11 refer to it as the University of Michigan study. And then  
12 there is the Rice study. So the Michigan study is  
13 Dr. Halderman and his colleagues. And then the Rice study, Dr.  
14 Byrne.

15 And in the Michigan study -- well, essentially what they  
16 were saying in summary is that voters do not in sufficient  
17 numbers verify their ballots. And they made that determination  
18 is my interpretation of their paper.

19 However, the Rice study came back and said that voters can  
20 actually identify their errors in their ballot and verify them  
21 if they actually take the time to do it.

22 So there is a distinction in the Rice study showing that  
23 if people don't look at their ballots obviously they can't  
24 verify it. But when they do look at it, they can verify at a  
25 high rate.

1           So the distinction was that the Rice study actually  
2 segregated that decision. Whereas, the Michigan study did not.

3   **Q.**    I see. So the difference between whether voters attempted  
4 to verify and whether voters can verify? Is that about  
5 accurate?

6   **A.**    Yes. There is a major difference.

7   **Q.**    And how about voter review and verification of hand-marked  
8 paper ballots? Are you aware of any research regarding that  
9 topic?

10   **A.**    I am not aware of any research. If it wasn't for this  
11 virus, the pandemic, we were planning to do a study on that  
12 very topic. However, there aren't any studies. But there have  
13 been elections that have pointed to weaknesses in voter  
14 verification of hand-marked paper ballots.

15   **Q.**    And what are some of those examples off the top of your  
16 head?

17   **A.**    The presidential election in 2000 here in Florida. We had  
18 paper ballots, and people left not knowing whether they had  
19 marked their ballots correctly. That is the first case.

20           There was a case in 2008 in Michigan, the Al Franken, Norm  
21 Coleman senate race. There were stray marks on the ballot.  
22 People didn't know if their vote would count.

23           2010, Alaska, Lisa Murkowski was written in. And people  
24 didn't know if their write-ins would count.

25           More recently, I think 2018 here in Florida, another case

1 where people completely missed a contest, and so they didn't  
2 even know.

3 So there are other examples of where hand-marked paper  
4 ballots have not been, I guess, verified accurately by the  
5 voters.

6 **Q.** Thank you, Dr. Gilbert. And in terms of that study you  
7 were referring to regarding the verification of hand-marked  
8 paper ballots -- right? -- when you say we, is that you at the  
9 University of Florida and your colleagues, colleagues from  
10 other institutions, or your lab there?

11 **A.** My lab. We were going to do a study on hand-marked paper  
12 ballots.

13 **Q.** And am I correct in that that is -- is that the Human  
14 Center Computer Lab?

15 **A.** Human Experience Research Lab. That is what we call it.  
16 HXR Lab.

17 **Q.** Dr. Gilbert, do you generally have an opinion about  
18 whether the use of BMD-based paper voting systems are  
19 sufficiently secure?

20 **A.** I would consider them sufficiently secure. There is risk  
21 associated with that. The key is minimizing those risks. So I  
22 would say the implementation can be sufficiently secure.

23 **Q.** And in terms of minimizing those risks and securing voting  
24 systems, are those topics you covered in the protecting the  
25 vote -- securing -- or excuse me -- Securing The Vote:



1 Protecting American Democracy report?

2 **A.** Yes.

3 **Q.** Is the Georgia BMD system implementation consistent with  
4 the recommendations of that report?

5 MR. CROSS: Objection, Your Honor.

6 **A.** In my opinion, yes.

7 MR. MILLER: I'm sorry. Is there an objection?

8 MR. CROSS: Yes.

9 Sorry, Your Honor. Could you hear me? I objected.

10 THE COURT: What is the basis of the objection?

11 MR. CROSS: He has never seen the Georgia system. He  
12 has no basis to answer the question he was just asked.

13 THE COURT: All right.

14 MR. MILLER: Your Honor, Dr. Gilbert is aware of the  
15 system setup and procedures and frankly --

16 THE COURT: I think you have to lay a foundation.

17 MR. MILLER: Well, frankly, the Securing the Vote  
18 report doesn't get into detailed system specifications. And so  
19 I'm asking about the consistency of the principles of the two  
20 systems.

21 MR. CROSS: He has never seen the Georgia system.

22 THE COURT: The objection is sustained. Just go  
23 ahead and ask the question rather than answering it yourself.  
24 All right?

25 **Q. (BY MR. MILLER)** Dr. Gilbert, considering the principles

1 contained in the Securing the Vote: Protecting American  
2 Democracy report and your understanding of the setup and  
3 implementation of Georgia's voting system, do you believe those  
4 two items are consistent?

5 **A.** Yes.

6 MR. CROSS: Objection, Your Honor.

7 THE COURT: Could you identify your objection  
8 specifically.

9 MR. CROSS: Sorry. It is the same objection. He  
10 asked the same question. He didn't lay a foundation. He has  
11 never seen the Georgia system. He can't speak to what the  
12 setup is or if it is secure or how it compares to some other  
13 system.

14 MR. MILLER: Your Honor, I'm trying to follow the  
15 Court's direction to not --

16 THE COURT: I know you are. I know you are. But I  
17 think you have to basically explain the basis of your --  
18 Dr. Gilbert, you reflect the basis of your conclusion, yes, and  
19 then identify what you know specifically personally about the  
20 Georgia system that makes it congruent with the principles that  
21 you think are summarized in the Protect the Vote report.

22 THE WITNESS: Sure. From what I understand, the  
23 implementation in Georgia -- the proposed implementation is air  
24 gapped. It produces a paper ballot. Those were the two  
25 fundamental principles that we wanted in a ballot-marking

1 device to give us extra security.

2 THE COURT: Air gapped and what was the second?

3 THE WITNESS: It prints a ballot that has human  
4 readable text on it.

5 THE COURT: So you are -- the air gapped is Number 1,  
6 that you wanted to be sure that it was air gapped meaning that  
7 there were no potential other inputs into it that would corrupt  
8 or --

9 THE WITNESS: Correct.

10 THE COURT: Okay. And I thought there was an  
11 auditing principle as well?

12 THE WITNESS: Yes. But that is independent of the  
13 BMD.

14 THE COURT: All right. Fine.

15 **Q. (BY MR. MILLER)** And, Dr. Gilbert, I believe you  
16 summarized some of these principles and properties in your  
17 declaration; correct?

18 **A.** Yes.

19 THE COURT: And your understanding is that it is air  
20 gapped, but you haven't personally observed or inspected any of  
21 the systems; is that correct?

22 THE WITNESS: Yes, Your Honor. That's correct.

23 THE COURT: Okay.

24 **Q. (BY MR. MILLER)** Dr. Gilbert, you mentioned audits there  
25 briefly. And a recommendation for risk-limiting audits, was

1 that included in the Securing the Vote report?

2 **A.** Yes.

3 **Q.** And in terms of your testimony in your declarations, when  
4 you discuss audits, on what basis are you offering those  
5 opinions? So in other words, are you offering an opinion as to  
6 detailed specifications or as to general principles of  
7 risk-limiting audits?

8 **A.** I'm offering that based on our report. The consensus  
9 committee was that we should have an audit, a risk-limiting  
10 audit. And I am not an expert in audits. I am following the  
11 principles of our consensus committee that did consist of  
12 individuals who have expertise in auditing.

13 **Q.** Dr. Gilbert, can I revert briefly to one thing you  
14 mentioned earlier regarding accessibility?

15 Do you have an opinion on a system which offers generally  
16 hand-marked paper ballots and separately BMDs for  
17 accessibility?

18 **A.** Yes. You have a scenario, which is the motivation for me  
19 even getting into this area of elections, where you create an  
20 environment where some people are voting on hand-marked paper  
21 ballots and some are voting with BMDs. You create a separate  
22 but equal connotation, and that simply doesn't work.

23 In practice, we have seen where people with disabilities  
24 show up to vote and the accessible machine is in the corner and  
25 the poll workers say, well, we don't know how to set it up.

1           And then there is the other scenario from a security  
2 perspective, which is if -- with the proliferation of  
3 ballot-marking devices, it has encouraged people with  
4 disabilities to vote. And that is a positive thing in my  
5 opinion.

6           With that said, you have increased the number of people  
7 with disabilities who actually participate in the elections  
8 now. With tight elections, it is very likely that or possible  
9 that you could have the number of people with disabilities  
10 voting to exceed the margin of victory.

11           In that particular scenario, if a ballot-marking device is  
12 used and if you claim that ballot-marking devices are  
13 compromised or vulnerable, that is an easier target. Meaning,  
14 if I only have to worry about people with disabilities using  
15 it, that empowers me to do more mischief in the machine because  
16 it is less likely to be detected. Whereas, if more people are  
17 using it, you increase the chance of it being detected.

18           So those are my opinions on segregating the electorate by  
19 people with disabilities and those who do not have them.

20       **Q.** And if I recall your prior testimony, that was part of the  
21 impetus of your creation of the Prime III voting system; right?

22       **A.** Yes. Because in 2002, the United States Congress created  
23 the Help America Vote Act and required at least one accessible  
24 voting machine in every voting place.

25           And in doing so, I realized what would happen. And in

1 bringing this to the attention of the EAC who was created  
2 shortly thereafter and others, they said it is impossible. You  
3 can't create one technology there one could use. So we did it.

4 **Q.** And that Prime III voting system, has that been used in  
5 actual elections?

6 **A.** Yes. To my knowledge, Prime III is the only open source  
7 voting technology to be used in state, federal, and local  
8 elections. The State of New Hampshire used it statewide as  
9 their accessible voting equipment, and then Butler County,  
10 Ohio, uses it as their absentee system. And to my knowledge,  
11 my lab is the only academic lab to produce a voting system that  
12 has actually been used.

13 MR. MILLER: Thank you, Dr. Gilbert. No further  
14 questions, Your Honor, with the -- I think I will probably need  
15 redirect.

16 THE COURT: All right. Thank you.

17 MR. CROSS: May I proceed, Your Honor?

18 THE COURT: Yes.

19 CROSS-EXAMINATION

20 BY MR. CROSS:

21 **Q.** Good morning, Dr. Gilbert.

22 **A.** Good morning.

23 **Q.** Dr. Gilbert, when were you retained by the State as a  
24 consultant for this case?

25 **A.** I don't recall. I would have to go look in my email or

1 records to get the exact date.

2 **Q.** Your first declaration was in November of last year. Do  
3 you remember if it was six months before that or a year before  
4 that?

5 **A.** Honestly I don't remember. Unfortunately I can't -- I  
6 don't remember.

7 **Q.** But we know you have been a consultant for the State in  
8 this case at least since November of last year; right?

9 **A.** If that is when my statement was at least, that would be  
10 correct.

11 **Q.** And in none of the declarations you have submitted in this  
12 case have you indicated that you've conducted any examination  
13 of Georgia's Dominion BMD setup; right?

14 **A.** That's correct.

15 **Q.** And, in fact, in none of your declarations you indicate  
16 you have conducted any cybersecurity assessment of Georgia's  
17 Dominion BMD system; right?

18 **A.** I have not had access to Georgia's BMD system. So I  
19 couldn't do any assessments.

20 **Q.** Did you ask for access?

21 **A.** No, I did not.

22 **Q.** You didn't think that was important for the opinions you  
23 are offering in the case; is that right?

24 **A.** No.

25 **Q.** No, that is right? I'm sorry. It gets confusing.

1     **A.**    No. I disagree with you. So I -- from my experience, I  
2     didn't ask because in prior litigation in the United States  
3     we -- many experts have never been given access to the  
4     equipment. So it never crossed my mind to ask simply because I  
5     know that has not been a precedent that I have seen.

6     **Q.**    So you thought it was important, but you did not ask for  
7     it? Is that what you are saying?

8                 MR. MILLER: Your Honor, asked and answered.

9     **A.**    It never crossed my mind because in prior -- from my  
10    experience, no one has gotten access to these machines. So it  
11    never crossed my mind. I never thought of it.

12    **Q.**    **(BY MR. CROSS)** In your November 2019 declaration, you  
13    wrote that the Georgia BMD system -- this is Paragraph 43 if  
14    you want to reference -- the Georgia BMD system includes a new  
15    EMS, which replaces the old EMS in its entirety, and there is  
16    simply no software continuity between the two systems to  
17    transmit viruses or malware.

18                Do you recall that?

19    **A.**    I don't recall it. But it is in my statement.

20    **Q.**    And you testified today that your understanding is the  
21    system is air gapped; correct?

22    **A.**    Correct.

23    **Q.**    And you don't know that because you have never seen it;  
24    right, sir?

25    **A.**    All I can do is go on the documents that are provided to



1 me. I have not -- again, I have not had access to the actual  
2 machine.

3 **Q.** So the answer to my question is yes, you don't know that  
4 it is air gapped and there is no continuity because you have  
5 never looked at the system; right?

6 **MR. MILLER:** Objection, Your Honor. Compounded  
7 question.

8 **THE COURT:** Just simplify the question.

9 **Q. (BY MR. CROSS)** You don't know that the system is air  
10 gapped because you have never looked at it? Yes or no, sir?

11 **A.** I have never looked at it. The documents told me it was  
12 air gapped.

13 **Q.** What documents?

14 **A.** There is a specification, I believe I have, about it. So  
15 that is my understanding.

16 **Q.** So you are assuming it is set up to some specification  
17 that you read; right?

18 **A.** Yes.

19 **Q.** Did you read the declaration that Dr. Halderman submitted  
20 on September 1st after your most recent declaration?

21 **A.** Yes.

22 **Q.** But you didn't respond -- you have not responded to that  
23 in anything you have submitted to the Court; correct?

24 **A.** I don't believe so, no.

25 **Q.** In the November 2019 declaration you put in, that

1 obviously does not address the use of the Georgia election  
2 system in 2020? We can agree on that; right?

3 **A.** I'm not understanding your question.

4 **Q.** You submitted a declaration in November of last year.  
5 Okay?

6 **A.** Okay.

7 **Q.** That predates the use of this system this year; right?

8 **A.** I submitted a declaration in November. My comments in  
9 that declaration may or may not apply to the 2020 election. I  
10 would have to know exactly what pieces of it are you claiming  
11 or would be claiming that are irrelevant or relevant.

12 **Q.** Let me try it this way: In none of your declarations do  
13 you discuss the application -- the actual use of the Georgia  
14 Dominion system in any 2020 election; correct?

15 **A.** In my declaration, I do not believe I discussed the 2020  
16 election.

17 **Q.** You talked about the Prime III voting system that you  
18 offer. That uses QR codes; right?

19 **A.** That is an option. It is not required. It has another  
20 technique called informed OCR, which stands for informed  
21 optical character recognition, which you do not have to have a  
22 QR code to use.

23 It would print the text and then use a technique through  
24 OCR -- this technique called informed OCR. So that is an  
25 option that election officials can turn on and use it or not.

1 Q. So there are BMD systems available today that do not use  
2 QR codes; right?

3 A. I don't know for certain.

4 Q. Didn't you just tell us yours does that?

5 A. Yes.

6 Q. Now, you talk about your -- you described the Prime III  
7 system as software independent; right?

8 A. Yes.

9 Q. And that is a recognized standard in the computer science  
10 field; right?

11 A. I wouldn't say computer science. I would say in the  
12 election community, yes.

13 Q. And software independent means that the election results  
14 do not depend on the correct operation of the software for the  
15 equipment that is used in the election; right?

16 A. No, that is not correct. Software independence says that  
17 a change -- an intentional or unintentional change in the  
18 software could not create an undetected outcome in the  
19 election.

20 Q. And nowhere in your declarations do you offer an opinion  
21 that the Georgia Dominion BMD system is software independent;  
22 right?

23 A. I don't recall if I discussed it or not. But based on my  
24 knowledge of the Georgia system, it is software independent.

25 Q. And that is knowledge where you are assuming it is set up

1 according to some specification in some document you read  
2 because you --

3 **A.** That's correct.

4 **Q.** Parallel testing cannot provide software independence for  
5 a voting system; right?

6 **A.** Parallel testing is -- not to sound jokingly, but  
7 seriously, parallel testing is independent of software  
8 independence.

9 **Q.** Right. It is a separate step from determining whether a  
10 system is software independent?

11 **A.** No. They are not related at all.

12 **Q.** Okay. And software verification, like logic and accuracy  
13 testing, also is not used to determine software independence  
14 for a voting system; right?

15 **A.** Right. Those things are used to detect errors or things  
16 like that. Software independence is not the same thing. It is  
17 a different concept.

18 **Q.** You believe the gold standard for securing elections  
19 should be the audit; right?

20 **A.** Correct.

21 **Q.** And you addressed audits at length in your November 2019  
22 declaration, including RLAs; right?

23 **A.** I wouldn't say at length. Again, I'm not an audit expert.  
24 So I didn't go into details of how an audit is executed or the  
25 theory behind the audit.

1 Q. But in your most recent declaration, you indicated that  
2 you are offering no opinions as to the specific procedure of  
3 recounts and RLAs in Georgia? So you are not offering any  
4 opinions on the audit procedures that are used in Georgia;  
5 right?

6 A. Not on the -- I'm -- my opinion is that you have to have  
7 an audit in guidance with our report from the National Academy.  
8 And we preference a risk-limiting audit is what we have said.

9 Q. You are not offering any opinion to this Court that the  
10 audit procedures that have been adopted in Georgia -- that  
11 those are reliable? You are just not opining on them at all?

12 A. Exactly.

13 Q. Okay.

14 A. That's correct.

15 Q. Have you examined the new rule that the Georgia State  
16 Elections Board adopted yesterday for RLAs in the State?

17 A. The new -- say that again. The new what?

18 Q. Are you aware that the Georgia State Elections Board, as I  
19 understand it, approved a rule yesterday that requires a single  
20 RLA for a single statewide race every other year and that race  
21 is to be selected by the Secretary of State? Have you seen  
22 that rule?

23 MR. MILLER: Objection, Your Honor. I think there  
24 needs to be a foundation laid as to what the rule is. And if  
25 Mr. Cross wants to give his opinion as to what the rule is,

1 then we can put him on the stand as an expert.

2 THE COURT: Well, that is a key provision of it. It  
3 is not the only part of the rule. He can ask about has he seen  
4 that.

5 A. No, I have not.

6 Q. (BY MR. CROSS) So you are not offering an opinion to the  
7 Court that that provision meets best practices or reliability  
8 standards for RLAs? That is not an opinion you are offering;  
9 right?

10 A. Correct. I am not offering that opinion.

11 Q. One of the concerns that has been raised about the  
12 Dominion BMD is that an attacker could infect the BMDs with a  
13 malicious code that causes them to print barcodes that do not  
14 match the printed text of the ballot; right?

15 A. Okay.

16 Q. You are aware that that is a concern; right?

17 A. I have heard that concern in this case and before this  
18 case.

19 Q. And your response to that is that such an attack is  
20 unlikely to go undetected in a jurisdiction conducting RLAs  
21 because an audit which recognizes a single inconsistent  
22 barcode/text combination would signal a significant problem?  
23 Do you remember writing that?

24 A. Yes.

25 Q. That sort of attack easily could go undetected in a

1 jurisdiction such as Georgia where none of the elections are  
2 subject to an RLA except possibly a single statewide election  
3 every other year; right?

4 MR. MILLER: Objection, Your Honor. The same  
5 objection as before.

6 THE COURT: If Georgia has such a system at this  
7 point as described in the question, that only -- that there is  
8 only one race where there will be a risk-limiting audit every  
9 other year, would that impact your assessment of whether there  
10 are adequate checks and balances for the issue of -- referenced  
11 as the concern in the BMD system?

12 THE WITNESS: I'm happy to answer that question, Your  
13 Honor. And I will begin by saying I would like to change the  
14 question somewhat. The context of this question is  
15 inappropriate and incorrect.

16 The context of the question is around the barcode  
17 versus the human readable text in the context of a  
18 risk-limiting audit. I would argue strongly that if we were  
19 using hand-marked paper ballots and you use --

20 THE COURT: All right. I'm sorry. I am asking you a  
21 question, and I'm really -- you are not free to move the  
22 subject. I'm really trying to find out about the question I  
23 posed.

24 It is not this versus something else at this  
25 juncture, and I understand that that is something you may want

1 to discuss later. But I am asking really about trying to  
2 follow up on counsel's question specifically.

3 THE WITNESS: Right. Specifically, if that scenario  
4 was to happen where the barcode did not match the human  
5 readable text and the audit did not occur on that contest, then  
6 you would miss that -- that change in the election. It would  
7 be missed.

8 THE COURT: Thank you.

9 **Q. (BY MR. CROSS)** Last topic, Dr. Gilbert. You understand  
10 that a different type of attack scenario that has been  
11 discussed concerning Georgia's BMDs is that both the barcode  
12 and the printed text could be altered so that neither reflects  
13 the selections of the voter? You understand that has been  
14 raised; right?

15 **A.** Yes.

16 **Q.** And your response to that is that the only measure you  
17 identified to detect that sort of hack is ensuring voters  
18 review their ballots? That is what you identified in your  
19 declaration; correct?

20 MR. MILLER: Objection, Your Honor. If Mr. Cross is  
21 pointing to the only thing that does something, he is certainly  
22 happy to read out or point him to a paragraph. At this point,  
23 we're characterizing multiple levels of testimony.

24 MR. CROSS: It is Paragraph 13.

25 **Q. (BY MR. CROSS)** Do you recall testifying to that?



1 THE COURT: Paragraph 13 of his August 26 --

2 MR. CROSS: It is his original declaration.

3 THE COURT: Of his original affidavit. All right.

4 MR. CROSS: Dr. Gilbert, do you need your  
5 declaration? Do you have it?

6 MR. MILLER: David, I think we're on the wrong --  
7 Paragraph 13 of the original declaration is, I have provided  
8 expert testimony.

9 MR. CROSS: I'm sorry. Yeah. I'm sorry. It is the  
10 most recent. Thank you, Carey.

11 THE COURT: All right. So it is at Document 821-7.

12 MR. CROSS: Yes, Your Honor. My apologies.

13 **Q. (BY MR. CROSS)** Dr. Gilbert, do you need to look at this?

14 **A.** No.

15 **Q.** So do you recall testifying that in the attack scenario in  
16 which both the barcode and the printed text are both altered --  
17 and you referenced Dr. Halderman's discussion of that -- you  
18 say the issue again is ensuring voters review their ballots.  
19 And then you go on to talk about research indicating that the  
20 type of interventions that you discuss improve voters' rates of  
21 review.

22 Do you recall that testimony?

23 **A.** Yes.

24 **Q.** And you cite specific research in your declaration; right?

25 **A.** Yes.

1 Q. And the very research you cite indicates that most voters  
2 don't review their ballots from BMDs when they submit them;  
3 right?

4 MR. MILLER: Objection, Your Honor. We have  
5 testimony as to research that can come from Dr. Gilbert and not  
6 from counsel.

7 THE COURT: Overruled.

8 MR. CROSS: I don't understand that.

9 THE COURT: Overruled. Continue and ask the  
10 question.

11 A. There is research that presents that an insufficient  
12 number of voters review their ballots.

13 Q. (BY MR. CROSS) I mean, the title of the research that you  
14 yourself cite -- literally the title is Voter Verification of  
15 BMD Ballots is a Two-part Question: Can they? Mostly, they  
16 can. Do they? Mostly, they don't. That is the title; right,  
17 sir?

18 A. I don't recall the title of the paper. I would have to  
19 look. Is that the Rice study?

20 THE COURT: He asked you a --

21 Q. (BY MR. CROSS) What are you asking me?

22 A. I cite two studies, which is the Michigan study and the  
23 Rice study, which I referenced earlier today.

24 Q. This is the study in 43 of your supplemental declaration  
25 by Kortum, Byrne, and Whitmore.

1     **A.**    Yeah.  That is the Rice study, yes.

2     **Q.**    Well, let's talk about the specifics since you don't  
3    remember the title.

4            You point out in your declaration that -- this is what you  
5    write.  Let me turn back.  This is at Paragraph 9 of your most  
6    recent declaration.

7            And you write, as the paper explains -- this is the Rice  
8    study -- the ability of voters to actually detect manipulation  
9    of their vote choices was quite good.  Then you put in  
10   parenthesis, of the 25 voters who actually examined the  
11   printout, 19 of them detected at least one anomaly.

12           Do you see that?  Do you remember that?

13   **A.**    Yes.

14   **Q.**    But what you don't tell the Court in your declaration is  
15   that those 25 voters who examined their ballots -- that was 25  
16   out of 108.  So only 23 percent of the voters who were in that  
17   study examined their ballots at all.

18           That doesn't appear in your declaration, does it, sir?

19   **A.**    I don't recall mentioning that.

20   **Q.**    You also point out, as we just read, that this study shows  
21   that prompts to review the ballot increases the odds that  
22   voters will do so.

23           Do you recall telling the Court that?

24   **A.**    Yes.

25   **Q.**    But you didn't -- you did not tell the Court that the

1 authors of that study themselves emphasized in the study --  
2 they write, the results here are not conclusive because the  
3 statistical power with only 25 voters is too limited. In other  
4 words, so few voters looked at their ballots at all that the  
5 author said you can't -- you can't reach any reliable  
6 conclusive results here.

7 That is not mentioned in your declaration, is it, sir?

8 **A.** No, I didn't mention that in my declaration.

9 **Q.** You agree that voting machines that do not provide the  
10 capacity for independent auditing, for example, machines that  
11 do not produce a voter verifiable paper audit trail, should be  
12 removed from service as soon as possible? You agree with that;  
13 right?

14 **A.** Are you referring to DREs, the machines that would store  
15 electronic ballots? Is that what you are referencing to?

16 **Q.** I am referring to something you wrote at -- if you turn to  
17 your supplemental declaration, it is Page 136. It looks like  
18 remarks that you delivered to the Chairperson Lofgren, Ranking  
19 Member Davis, Members of the Committee.

20 Do you recall this? You attached it to your declaration.

21 **A.** Yes.

22 **Q.** Do you recall saying in that what I just read to you,  
23 voter machines that do not provide the capacity for independent  
24 auditing, for example, machines that do not produce a voter  
25 verifiable paper audit trail, should be removed from service as

1 soon as possible? Do you recall saying that?

2 **A.** I recall this, yes.

3 **Q.** You also agree that each state should require a  
4 comprehensive system of post-election audits of processes and  
5 outcomes; correct, sir?

6 **A.** Yes.

7 MR. CROSS: I have no further questions, Your Honor.

8 MR. BROWN: Your Honor, I have a few questions on  
9 cross. This is Bruce Brown.

10 THE COURT: All right.

11 CROSS-EXAMINATION

12 BY MR. BROWN:

13 **Q.** Dr. Gilbert, my name is Bruce Brown. I represent the  
14 Coalition plaintiffs in this case.

15 If we could see Plaintiffs' Exhibit Number 1, please. If  
16 you could screen share that, please, Clinton. This is a  
17 different exhibit. But I will start with this just to move  
18 quickly.

19 Dr. Gilbert, I have put on the screen what I will call  
20 Gilbert Demonstrative Number 1. And let me walk you through  
21 this for purposes of analysis.

22 Mr. Cross just went over with you the detection rate from  
23 the Rice University study, which was 19 out of 108. Do you  
24 follow me?

25 **A.** This is the recent study by Byrne and Kortum?

1 Q. That's correct.

2 A. I thought it was 25.

3 Q. I think if you look closely, 25 of the voters looked at  
4 their ballot.

5 A. I see what you are saying. Okay. I'm with you now.  
6 Okay.

7 Q. 19 detected some error in the ballot. Are you with me?

8 A. Okay. Go ahead.

9 Q. Let me quickly go through a hypothetical and see if you  
10 agree with my analysis. Let's say you have 4 million voters.  
11 Half -- that's the second row.

12 Do you follow me?

13 A. Yes.

14 Q. And then half of them are BMD voters. Okay. Half mail  
15 voters. Are you with me?

16 A. Yes.

17 Q. Let's say five percent of the BMD ballots were hacked.  
18 That would be 100,000; correct?

19 A. Okay.

20 Q. And the number of hacks using your numbers detected --

21 A. My numbers? I thought you said this is the Rice study;  
22 correct?

23 Q. Yes. I'm using a hypothetical election. Okay? Yeah.  
24 The Rice study.

25 A. You said -- you referred to it as my numbers. Have you

1     seen my numbers?

2     **Q.**     That is correct. I'm using the Rice study numbers.

3     **A.**     Okay. I thought you were using numbers from things we  
4     have done. But that is -- that is the Rice numbers. I see.

5     **Q.**     The Rice numbers, which are actually more generous to BMDs  
6     than would be, for example, the Michigan study.

7             Do you follow me?

8     **A.**     Okay.

9     **Q.**     And let's say that -- let's say that five percent of the  
10    ballots were hacked -- the BMD ballots were hacked. That would  
11    be 100,000 ballots.

12            Are you with me?

13    **A.**     Okay.

14    **Q.**     And according to the Rice detection rates, that would be  
15    about 17-, 18,000 that would be detected; correct?

16    **A.**     So -- okay. I'm doing the math. Okay.

17    **Q.**     And then --

18            MR. MILLER: Your Honor, I would like to just offer  
19    an objection to whatever this demonstrative is here and  
20    wherever it came from, other than out of counsel's head or at  
21    least for some foundation to the witness as far as --

22            MR. BROWN: This is not an objection.

23            THE COURT: This is an objection as to -- is this  
24    data from the Rice study, or are these numbers that you have  
25    assembled not from the Rice study, Mr. Brown? I think that is

1 all I need to confirm.

2 MR. BROWN: The only number that is from the Rice  
3 study is the top row. The other is a hypothetical use for  
4 purposes of cross-examination.

5 THE COURT: All right. For ease, we're going to go  
6 ahead. I may just in the end not consider this at all.

7 But go ahead.

8 **Q. (BY MR. BROWN)** And then, Mr. Gilbert, if 18 percent of  
9 the mistakes are caught and detected, let's say those people  
10 get their votes redone. Do you follow me? They go to the poll  
11 worker and say change my vote; right? Are you with me?

12 **A.** Correct.

13 **Q.** That would still leave 82,000 undetected hacks. Do you  
14 follow me? Because most of the people don't check. And those  
15 that check, not all of them notice the mistake.

16 Are you with me?

17 **A.** No, I don't agree.

18 **Q.** Well, do you think there is data that more people would  
19 check and catch that?

20 **A.** Absolutely. So we had an incident in, I think, a 2008  
21 election in West Virginia. And there was an allegation of vote  
22 flipping on a DRE. People were trying to vote for Barack Obama  
23 and they said it flipped to John McCain.

24 And when that happened to one person, that spread like  
25 wildfire. And the community of voters were more vigilant and



1 looked. And we discovered what really happened in that wasn't  
2 that the software was hacked or anything. It was a human error  
3 of where they were touching the screen.

4 So in this analogy that if an individual says this printed  
5 my vote wrong, this is not how it worked, that somehow that  
6 case would be isolated is -- I beg to differ that it would be  
7 isolated.

8 So in an election, I would suspect the numbers of people  
9 looking would increase as a result of the rumor that the  
10 machines are misbehaving.

11 **Q.** Okay. Well, that is actually exactly my point of this.  
12 But if -- if only 18 percent of the people caught the mistake,  
13 there would still be 82 percent of the people who did not;  
14 correct?

15 **A.** If 18 percent, just doing the math, and you subtract the  
16 number, then you get that number as you have. If 50 percent  
17 checked, then it would be cut in half. That is -- the math  
18 says so.

19 **Q.** And given in this hypothetical though, with so few people  
20 detecting it and a material but not gigantic hack, you have  
21 less than one percent of the voters would be reporting changed  
22 votes? Do you follow me? The last row.

23 **A.** I think that is correct mathematically.

24 **Q.** Okay. And this would affect 164,000 impact upon the  
25 election. Do you follow me? Because you are switching 82,000

1 votes, which you would have to double if it is going from  
2 candidate A to candidate B. Do you follow me?

3 **A.** I'm not following that exactly. But I see the math behind  
4 it, as far as the percentage of being less than one percent. I  
5 see that part.

6 **Q.** And so with --

7 **A.** The total impact, I'm not understanding that part.

8 **Q.** Okay. The 164,000-vote impact would be enough to change  
9 the electoral results in 2018 in Georgia for the Governor's  
10 election, the Lieutenant Governor's election, the Attorney  
11 General's election, and the election for the Secretary of  
12 State; right?

13 **A.** I don't know the margins of victory to any of those  
14 contests.

15 **Q.** But that would be in the public record; right?

16 **A.** Yes. Those margins of victories.

17 **(Electronic interference)**

18 THE COURT: All right.

19 MR. BROWN: Okay. Let me move on. If I could have  
20 PX 1 -- Plaintiffs' Exhibit 1 put on the screen. Thank you.

21 **Q. (BY MR. BROWN)** Dr. Gilbert, I have shown you Plaintiffs'  
22 Exhibit 1. Can you see that where you are?

23 **A.** Can you zoom in a little more? That is better.

24 **Q.** Okay. This appears to be a Fayette County official ballot  
25 for, it says, the May 19 election, which I don't think

1 occurred. But it is a real ballot. But because of the virus,  
2 the date changed. Just -- so bear with me on that.

3 Would you -- Clinton, would you scroll through that ballot  
4 and just show how long it is.

5 Dr. Gilbert, would you agree with me that it could be very  
6 hard for someone to remember all of the different races on this  
7 ballot?

8 **A.** Yes, I would agree with that.

9 **Q.** And it would be virtually impossible for a voter without a  
10 separate slate to be able to remember how they voted on all of  
11 these; correct?

12 **A.** I don't agree with that.

13 **Q.** But if an election was left out, they would likely never  
14 catch it -- correct? -- depending on the election?

15 **A.** I don't agree with that either.

16 **Q.** And the -- are you saying that a voter would remember  
17 judge for the Court of Appeals between Elizabeth -- whether  
18 they voted for Elizabeth Dallas Gobeil -- they would remember  
19 that?

20 **A.** It depends on the voter.

21 **Q.** Okay. But your testimony depends upon the verifiability  
22 and -- verifiability of the ultimate result of the election  
23 depends upon most voters checking and most voters being able to  
24 check; correct?

25 **A.** Correct.

1 Q. Let me direct your attention back to your testimony about  
2 software independence. And you can take -- Clinton, you can  
3 take this exhibit down.

4 You would agree with me that a soft -- an election system  
5 must be software independent; correct?

6 A. Yes.

7 Q. And by software independent, do you mean that an  
8 undetected change in software cannot cause a detected change in  
9 the outcome?

10 A. That is the definition of software independence.

11 Q. And is it your testimony that BMDs -- that there cannot be  
12 an undetectable change in the software?

13 A. Say that again.

14 Q. Are you saying that someone can't make an undetectable  
15 change in the BMD software?

16 A. No, I'm not saying that.

17 Q. So there can be an undetectable change; correct?

18 A. There is a possibility.

19 Q. And if there is an undetectable change in the software  
20 that changes the voter's choice from between the selection on  
21 the screen to the BMD printout, how is that going to be  
22 detected in the result?

23 A. The voter would be there first to verify the printout.

24 Q. So it is dependent entirely upon the voter's capacity,  
25 ability, patience, intelligence, and the vote -- the ballot --

1 let me strike that.

2 So it is entirely dependent upon the voter; correct?

3 **A.** I wouldn't say entirely. I would say the first line of  
4 defense is the voter to verify their ballot. That is the first  
5 step. It is not the only step, but it is the first step.

6 **Q.** Okay. You talked about risk-limiting audits and their  
7 importance to the auditing process; right?

8 **A.** Correct.

9 **Q.** And with a BMD system, a risk-limiting audit is auditing  
10 what the BMD says the voter says, not what the voter says;  
11 correct?

12 **A.** No.

13 **Q.** But literally it is auditing what the BMD says; correct?

14 **A.** No.

15 MR. MILLER: Your Honor --

16 **Q. (BY MR. BROWN)** Why isn't it?

17 MR. MILLER: It is the same question he just said no  
18 to.

19 **Q. (BY MR. BROWN)** Why isn't it?

20 THE COURT: I agree. Go ahead.

21 **A.** It is not because that argument would suggest if I'm  
22 auditing a hand-marked paper ballot I'm auditing what the ink  
23 pen says.

24 **Q. (BY MR. BROWN)** That's correct. The difference is between  
25 an ink pen and a computer; correct?

1     **A.**    No.  The difference is that the human being is controlling  
2     the marks.  Therefore the marks are verified on paper unless --  
3     and I haven't seen this yet -- unless the paper itself has some  
4     intelligence where if you write the ink on it that would be an  
5     example of what you are saying.  But if I look at my ballot and  
6     I say this is correct, then it is not -- those are my choices,  
7     not the BMD's choices.

8                 MR. BROWN:  Thank you, Dr. Gilbert.

9                 MR. MILLER:  Your Honor, if I could briefly on  
10     redirect just two or three questions.

11                THE COURT:  Sure.

12                                 REDIRECT EXAMINATION

13     BY MR. MILLER:

14     **Q.**    Dr. Gilbert, there was a lot of discussion about  
15     risk-limiting audits and opinions you are and are not making;  
16     right?  Do you know what I'm referring to?

17     **A.**    Right.

18     **Q.**    You wouldn't consider yourself a statistician; right?

19     **A.**    Correct.

20     **Q.**    And so when you are saying you are not discussing the  
21     implementation and protocols of audit procedures, would  
22     selecting which races to audit be included in that?

23     **A.**    Correct.  I'm not addressing any of that.  That is not my  
24     expertise.  I'm not familiar with how -- the execution or the  
25     accuracy of it.  Again, I'm supporting our consensus committee

1 report that we should use these in elections.

2 Q. Thank you. And, Dr. Gilbert, you were shown a plaintiffs'  
3 exhibit --

4 MR. MILLER: And, Bruce and David, I apologize. I'm  
5 not sure what the exhibit number is. But it was 821-7, the  
6 Congressional testimony.

7 Q. (BY MR. MILLER) Dr. Gilbert, do you recall looking at  
8 that?

9 A. I guess. I don't know it by number. But -- I wouldn't  
10 know by exhibit number.

11 MR. MILLER: Would plaintiffs mind putting the  
12 exhibit up?

13 MR. CROSS: Let me see if we have it. We didn't  
14 actually show it to him. It is just his testimony in his  
15 declaration.

16 MR. MILLER: You had the screen share up of the  
17 Congressional testimony.

18 MR. CROSS: Oh, I didn't know that. I didn't know  
19 that came up.

20 All right. Clinton, can you bring that back up?

21 (There was a brief pause in the proceedings.)

22 Q. (BY MR. MILLER) Dr. Gilbert, you recall us talking about  
23 this a few minutes ago; right?

24 A. Okay. Yes.

25 Q. And this was attached to your declaration; right?

1     **A.**    Yes.

2     **Q.**    And when you are referring to Chairperson Lofgren and  
3     Ranking Members of the Committee, was that testimony you were  
4     invited to present to U.S. Congress?

5     **A.**    Yes.

6     **Q.**    And what was the subject matter of that testimony?

7     **A.**    Election security.

8     **Q.**    And you can take it off the screen now.  Thank you.  I  
9     apologize.

10           Dr. Gilbert, Mr. Brown asked you about a 160,000-vote  
11     impact.  Do you recall that?

12     **A.**    Yes.

13     **Q.**    And you testified about the number of disability voters in  
14     elections; right?

15     **A.**    Yes.

16     **Q.**    And do you have an opinion as to whether that 160,000  
17     number could apply with equal force to disabled voters voting  
18     on BMDs?

19     **A.**    I don't know the exact number in Georgia.  I can get that.  
20     We had a grant where I worked with a group of researchers from  
21     Rutgers who record that every year, the number of people with  
22     disabilities who participate in elections.

23           And, again, since BMDs have been introduced, that  
24     technology makes it easier.  We are seeing an increase.  So  
25     that you could have 200,000 people with disabilities voting in



1 that election in Georgia. My best guess would be you could  
2 have that number, given the number of people who live in  
3 Georgia and participate.

4 **Q.** And one last thing. I believe you discussed earlier with  
5 Mr. Brown's hypothetical looking at a hand-marked ballot and  
6 confirming that is correct; right? Do you recall that  
7 discussion?

8 **A.** Yes.

9 **Q.** To your knowledge, are you aware of any hand-marked paper  
10 ballot verification studies other than the study you intended  
11 to conduct had COVID not occurred?

12 **A.** I'm not aware of any.

13 **Q.** And you look at a lot of these articles; correct?

14 **A.** Yes.

15 **Q.** And the subject matter?

16 **A.** Yes, I do.

17 **Q.** Dr. Byrne from Rice, Dr. Dan Wallach from Rice?

18 **A.** Yes.

19 MR. MILLER: No further questions, Your Honor.

20 MR. BROWN: Your Honor, just for the record, we  
21 introduced and would like to have admitted Exhibit 1, PD 17 is  
22 the demonstration table.

23 MR. MILLER: Your Honor, we would object to the  
24 admission of that exhibit for its substance.

25 THE COURT: This is the data example that you gave,

1 Mr. Brown?

2 MR. BROWN: Yes, Your Honor.

3 THE COURT: All right. Well, we're going -- why  
4 don't we just use it -- refer to it as a demonstrative.

5 MR. BROWN: Yes, sir. That was the intent.

6 THE COURT: Yes, Dr. Gilbert?

7 THE WITNESS: Yes. And that demonstration, if that  
8 is going to be entered, I would ask that a correction be made.  
9 That is not Gilbert. He was referring to a study --  
10 hypothetical study that didn't include our work. If he wants  
11 to see our work in this area, I'm happy to.

12 THE COURT: All right. I'm sorry. I didn't -- sir,  
13 I allowed it to be used as a demonstrative, which is something  
14 different than an exhibit in the record. It was used for  
15 examination of you. It basically brings information out.

16 My understanding is that the original percentage was  
17 based on the Rice study that was on the top column.

18 Do you disagree with that now?

19 THE WITNESS: That is my understanding as well. I  
20 just don't want my name associated with a false accusation that  
21 we did a study that shows that percentage. Because that is  
22 not -- that is not Gilbert's work. I don't want a work  
23 associated with me that wasn't my work.

24 MR. BROWN: Thank you, Dr. Gilbert. Thank you. I  
25 understand your correction to that.

1 THE COURT: I just want to make sure, Dr. Gilbert.  
2 Are you -- I understand that you do not view yourself as an  
3 expert on auditing. But are you in any way walking back your  
4 agreement with the committee's report to Congress that  
5 risk-limiting audits were an essential part of accepting a  
6 voting machine process that is a computerized voting machine  
7 process?

8 THE WITNESS: No, not at all, Your Honor. I believe  
9 risk-limiting audits should be used, whether it is a BMD or  
10 hand-marked paper ballot. In both cases, you need the  
11 risk-limiting audit. And it is the same reason.

12 THE COURT: Okay. Thank you.

13 All right. Can this witness be excused?

14 MR. CROSS: Yes, for our purposes.

15 THE COURT: All right.

16 MR. MILLER: Thank you, Dr. Gilbert.

17 THE COURT: Thank you very much, sir.

18 THE WITNESS: Thank you.

19 THE COURT: Who is the next witness?

20 MR. CROSS: Your Honor, our next witness is Vincent  
21 Liu.

22 THE COURT: All right. This is for plaintiffs'  
23 counsel. I mean, I realize that you have different clients and  
24 that you explore somewhat different issues.

25 But just as a matter of time, I think you really need

1 to think about whether both of you have to examine the witness.  
2 Because -- I'm not going to say you are disallowed because you  
3 have different clients. But that was a substantial amount of  
4 examination from both of you. And I think that it -- I think  
5 you might have been able to make it shorter, frankly, if you  
6 had one person who was doing it or you really decided you were  
7 going to divide the topics completely.

8 MR. BROWN: Thank you, Your Honor. We hear you loud  
9 and clear.

10 THE COURT: All right. All right. Is Dr. Liu with  
11 us?

12 THE WITNESS: Yes. Can you guys hear me?

13 THE COURT: I'm looking for him at this point.

14 THE WITNESS: Can you guys hear me okay?

15 THE COURT: Yes.

16 THE WITNESS: Okay. Great.

17 THE COURT: I want to make sure the court reporter  
18 can hear you.

19 You are fine, Ms. Welch?

20 COURT REPORTER: Yes, ma'am.

21 THE COURT: Mr. Liu, would you -- or, Dr. Liu, would  
22 you raise your right hand.

23 **(Witness sworn)**

24 THE COURT: And state your name and location.

25 THE WITNESS: Vincent Liu, San Francisco, California.

1 THE COURT: Thank you very much.

2 Plaintiffs' counsel, who will be examining Dr. Liu?

3 I'm sorry. Which plaintiffs' counsel will be --

4 MR. CROSS: Eileen, come back over here. I'm sorry.

5 We were trying to do it in separate spaces. She's coming.

6 MS. BROGAN: Forgive me, Your Honor. We were trying  
7 to use the second room. And our tech problems persist.

8 THE COURT: All right.

9 MS. BROGAN: May I?

10 THE COURT: Go ahead.

11 Whereupon,

12 VINCENT LIU,

13 after having been first duly sworn, testified as follows:

14 DIRECT EXAMINATION

15 BY MS. BROGAN:

16 Q. Mr. Liu, the Court has your CV. It was submitted with  
17 your declaration.

18 THE COURT: I'm sorry. Could you go ahead and  
19 introduce yourself for the record.

20 MS. BROGAN: Forgive me. I'm Eileen Brogan on behalf  
21 of Curling plaintiffs.

22 THE COURT: Go ahead.

23 Q. (BY MS. BROGAN) Mr. Liu, as I was saying, the Court, I  
24 think, has your CV, and it is generally aware of your  
25 qualifications. So I would ask that you just briefly describe

1 your background and experience.

2 **A.** Sure. Absolutely. I have been in cybersecurity  
3 specifically focused in the offensive space -- offensive side  
4 of security for 21 years. After high school, I went to work  
5 with the National Security Agency as a global network  
6 exploitation analyst.

7 After which, I went to work with Ernst & Young in their  
8 advanced security centers as a consultant. And I led the  
9 global penetration testing team for Honeywell International and  
10 in 2005 cofounded Bishop Fox until today where I am the CEO.

11 **Q.** And can you briefly describe what type of work you do in  
12 the cybersecurity sphere at Bishop Fox?

13 **A.** Yes. We are hired by some of the most sophisticated,  
14 largest companies in the world to perform product security  
15 testing, application security testing, penetration testing,  
16 code reviews, red teaming. Essentially companies hire us to  
17 find vulnerabilities within their systems to identify  
18 weaknesses.

19 And we do this for 8 of the top 10 technology companies in  
20 the world, 10 of the top 20 retailers, 5 of the top 5 media  
21 companies. The problems we solve, the things we do include,  
22 for example, this Zoom call that we are on.

23 MS. BROGAN: Thank you.

24 Your Honor, we would ask defendants to stipulate to  
25 Mr. Liu as an expert in computer science with a focus on

1 cybersecurity. And as I understand, Mr. Tyson doesn't have an  
2 objection.

3 MR. TYSON: That is correct, Your Honor. We don't  
4 have an objection to having Mr. Liu testify as a computer  
5 science expert with a focus on cybersecurity.

6 THE COURT: All right. I'll accept it.

7 MS. BROGAN: Thank you.

8 **Q. (BY MS. BROGAN)** Mr. Liu, have you had an opportunity to  
9 review the two declarations submitted by State defendants for  
10 Mr. Cobb in this matter?

11 **A.** Yes, I have.

12 **Q.** Mr. Cobb addresses this issue of whether the QR codes  
13 produced by the BMDs are encrypted.

14 Have you done your own analysis to determine whether the  
15 QR codes are encrypted?

16 **A.** Yes. Yes, I have.

17 **Q.** And what did you find?

18 **A.** In examination of the QR codes, we identified that the QR  
19 codes were not encrypted, certainly not with any known  
20 industry-accepted standard algorithm.

21 And the process that we undertook to perform the  
22 verification was to develop code that read the QR code.  
23 Wherein, we were able to extract the raw data and determine  
24 that it was -- whether or not it was encrypted. And our  
25 conclusion was that it was not.

1 Q. And what did you understand Mr. Cobb to say with respect  
2 to encryption of these QR codes?

3 A. In his -- I believe it is in his declaration he states  
4 that these QR codes are signed and encrypted. And that is not  
5 a correct statement.

6 Q. In his second declaration, does he continue to suggest  
7 that the QR codes are encrypted?

8 A. I would need to -- I would, yeah, probably want to take a  
9 look at that second declaration to understand exactly which  
10 section you are referring to.

11 Q. Sure. Okay.

12 A. But certainly in the first one, he does make that  
13 statement. And it is not correct.

14 Q. Okay. Actually, we could pull up -- let me ask it this  
15 way: Do you understand a distinction between QR codes that are  
16 encrypted and QR codes that are encoded?

17 A. Yes. There is a big distinction. It is a fundamental  
18 distinction. Coding and encryption are two very different  
19 things.

20 Q. So if Mr. Cobb had walked back his analysis that the QR  
21 codes were encrypted and now suggests that they are encoded,  
22 would that make a difference?

23 A. Yes. And I think if that is what you are referring to,  
24 Mr. Cobb does state in his second declaration that they are  
25 encoded and not encrypted.



1           In fact, I think you are referring to the part where he  
2       talks about it being semantics. And it is not. Actually, I  
3       would disagree with that. It is not a minor point about  
4       semantics at all. It is a very basic but fundamental  
5       distinction between the two of them.

6           The use of encryption implies that there is an algorithm  
7       that confers some measure of security to the system. Encoding  
8       does not. Encoding is actually quite different. It confers  
9       usability. It is designed and often used for interoperability.  
10      It does not provide security to a system. So --

11           THE COURT: I'm sorry. Let me just interrupt you for  
12      a second. It is used for -- you used a word, and I just didn't  
13      hear it.

14           THE WITNESS: Yes. It may be a term of art within  
15      the industry. Maybe a way to think about it is encryption is  
16      used to provide for security. Encoding is intended and  
17      designed for usability. It is to make information more easily  
18      accessible, which is oftentimes counter to, say, encryption,  
19      which is something more secret. It is -- I mean, it is a  
20      concept that is very, very fundamental.

21      **Q. (BY MS. BROGAN)** And what about digital signatures? Do  
22      they play any role?

23      **A.** Yes. So, you know, typically when you are thinking about  
24      digital signatures, you are referring to the use of public-key  
25      cryptography. And the intention is to provide for integrity.

1           In this case, public-key cryptography was not being used  
2     with QR codes. And so the implication is that with the BMDs  
3     and the generation of the QR codes the QR codes themselves --  
4     the implication with the design of the Dominion BMD system is  
5     that any device that has necessary keys to operate would be  
6     able to generate a fake QR code. And you would not be able to  
7     determine which machine generated it, whether it was the EMS,  
8     the BMD, the ICP, or any other system that had that key loaded  
9     on to it.

10    **Q.**    I would also like to ask you about the paragraphs of  
11    Mr. Cobb's supplemental declaration where he indicates he is  
12    responding directly to you.

13           If it is helpful, we can just pull up that section of the  
14    declaration. It is marked as Plaintiffs' Exhibit 29.

15    **A.**    Yeah. Would that be all right to pull it up as reference?

16           MS. BROGAN: Clinton, could you pull that PX 29 up.

17    **Q.    (BY MS. BROGAN)** On the bottom of Page 4, Mr. Cobb  
18    indicates he is replying to Mr. Liu. And then it continues on.

19           Mr. Cobb stated in his original declaration that Georgia's  
20    voting system has a hash value that would make it impossible to  
21    detect alterations to the software.

22           THE COURT: I'm sorry. I don't see where you are  
23    reading from.

24           MS. BROGAN: I'm sorry, Your Honor. I am -- this is  
25    already in the record. This is from Mr. Cobb's original

1 declaration.

2 THE COURT: All right. Fine.

3 MS. BROGAN: Forgive me.

4 THE COURT: That is all right.

5 **Q. (BY MS. BROGAN)** So Mr. Cobb stated that Georgia's voting  
6 system has a hash value that would make it possible to detect  
7 alterations to the software.

8 Do you recall responding to that in your declaration?

9 **A.** Yes, I do.

10 **Q.** How did you respond to that statement?

11 **A.** Yeah. The check that Mr. Cobb describes I think I  
12 characterized as security theater. The verification of a  
13 checksum in that manner is rife with issues. An infected BMD  
14 system could very easily report any value that it wanted to.

15 I guess an analogy would be giving somebody a test, asking  
16 them to grade it for themselves, and then asking them to report  
17 the -- to self-report the results. And if you have an infected  
18 BMD that has been compromised, it can just tell you whatever  
19 value that it wants.

20 So that check -- I mean, that type of exploit is commonly  
21 used to bypass verification systems. It is seen in the wild.  
22 It is things that we do as part of our professional work.

23 **Q.** And do you have an understanding -- particularly with  
24 respect to these Paragraphs 13 and 14, do you have an  
25 understanding of how Mr. Cobb is responding to that opinion you

1 just shared, that the malware can circumvent the check and that  
2 you are relying on a compromised system to check itself? Do  
3 you understand his response in these paragraphs?

4 **A.** Yes. When I reviewed his response, I think actually in  
5 Article 12 or Paragraph 12, he says he's not going to respond  
6 to all of the allegations. I only make two claims. So he is  
7 simply ignoring the first claim or choosing not to respond to  
8 the first claim.

9 What he does respond to is the second claim around QR code  
10 security. It is interesting because if you read it -- when I  
11 first read it, it looked like he was trying to respond to and  
12 point out a specific technical issue or, you know, flaw in the  
13 reasoning.

14 He does not, in fact. He is actually really only pointing  
15 out not a question of whether the QR code can be faked but when  
16 it can be faked. And he is simply saying that in order for the  
17 QR code to be faked, the BMD or other systems would need to  
18 have a key provided to it from the EMS system.

19 And that is true. That key needs to be provided from the  
20 EMS to the BMD before the start of any election. An election  
21 can't run without that key. So, again, it is not a matter of  
22 whether it can happen. It is just a matter of when. And  
23 whenever that election worker, that poll worker loads that key  
24 before an election on to those systems, which it has to do,  
25 then whether it is two weeks or two days before or two minutes

1 before the election starts, at some point those systems will  
2 have to have the material that is necessary. And they will be  
3 able to fake a QR code.

4 THE COURT: Will be able to what?

5 THE WITNESS: Fake the QR codes.

6 THE COURT: Fake the QR codes. Okay.

7 THE WITNESS: In a way that the other readers can't  
8 detect.

9 MS. BROGAN: Thank you, Mr. Liu.

10 Your Honor, I have nothing further.

11 THE COURT: Thank you.

12 MR. TYSON: Are you ready for me, Your Honor?

13 THE WITNESS: Yes.

14 CROSS-EXAMINATION

15 BY MR. TYSON:

16 **Q.** Good morning, Mr. Liu. My name is Bryan Tyson. I  
17 represent the State defendants. I just have a couple of quick  
18 questions for you.

19 You mentioned that you examined QR codes as part of your  
20 analysis here. What QR codes did you examine?

21 **A.** We were provided with a sample ballot I believe -- I  
22 believe potentially from one of the elections. I would need to  
23 look at the exact source. I believe it was produced by a  
24 Dominion system.

25 **Q.** Was it for an election in Georgia, or was it just a

1 Dominion ballot generally?

2 **A.** I would need to double-check where the source of that was.  
3 It was provided as part of an overall package of information  
4 pertaining to this case.

5 **Q.** And provided by the plaintiffs' counsel to you; correct?

6 **A.** That's correct.

7 **Q.** And you have never personally examined the Dominion BMD  
8 system being used in Georgia; correct?

9 **A.** Can you clarify that question? There is a number of  
10 different ways. And I'll help you with that. But there's a  
11 number of different ways that we can actually examine the  
12 system.

13 Do you mean physically in person, remotely -- or there is  
14 a method of examination which is through documentation and  
15 architectural analysis. I'm not exactly sure what you are  
16 asking.

17 **Q.** Certainly. Let me just break it into pieces. Have you  
18 ever physically examined a Dominion -- any component of a  
19 Dominion BMD system in Georgia hands-on?

20 **A.** I have not.

21 **Q.** Have you ever analyzed the software of any component of a  
22 BMD system in Georgia?

23 **A.** I have not.

24 **Q.** And you don't have any personal knowledge about how  
25 encryption keys are handled by the Dominion BMD and ICP

1 scanners, do you?

2 **A.** I do.

3 **Q.** And where did you obtain that knowledge?

4 **A.** So this is a third method of performing a security  
5 assessment. It is a technique that is called threat modeling  
6 architectural review. This is the process that we used in this  
7 case whereby we reviewed documentation, we examined the  
8 behavior of the systems, and we examined the artifacts of it in  
9 order to determine the behaviors.

10 And this is the method in which we determined that QR  
11 codes, for example, in this situation were not being encrypted.  
12 And so that model called threat modeling or architectural  
13 analysis looking at some of the byproducts is a commonly used  
14 technique in the industry.

15 **Q.** So your opinions are based on a review of the QR codes  
16 that you were provided by plaintiffs' counsel in the  
17 documentation for the system; is that fair to say?

18 **A.** Documentation of the system, reports that we have reviewed  
19 from Pro V&V, other reports that we have seen online, things of  
20 that nature from various certification bodies. Yes.

21 **Q.** And you have never seen actual malware that would produce  
22 a false checksum in a Dominion BMD; correct?

23 **A.** In a Dominion BMD, no.

24 **Q.** And you would agree that a hash comparison using a SHA-256  
25 checksum is a valid way of determining whether software has

1    been modified setting aside -- as a general proposition;  
2    correct?

3    **A.**    Yeah.  You have to be really careful when you make that  
4    statement.  I think it oversimplifies the whole process.  So  
5    without context, I mean, you could say sort of in a vacuum that  
6    is true.  It would be like saying encryption can be secure.

7           But it all comes down to implementation.  And I would  
8    qualify that by saying, yes, the use of SHA-256 as a hashing  
9    function is currently known to be an acceptable standard.  But  
10   as it is deployed within the Dominion devices, it does not  
11   appear to be used in a fashion that could be considered secure.  
12   It can be easily circumvented.

13   **Q.**    And that is based on your review of documentation, not  
14   based on actual analyzing how the SHA-256 hash value is created  
15   by the BMD; correct?

16   **A.**    Can you clarify that question?

17   **Q.**    Yes.  You stated that the implementation was key and that  
18   it may be a valid way to do it.  But I just want to clarify:  
19   You haven't personally examined the software of a BMD beyond  
20   the documentation to reach that opinion, so you are proposing  
21   something, but you don't know that for certain; correct?

22   **A.**    Yes and no.  I'm familiar with the version of Android that  
23   is being used by the BMD system.  I'm familiar with the general  
24   principles of how the software checksum works.  Both of those  
25   data points -- those are hard data points -- indicate to me



1 that the implementation of malware would be feasible.

2 But I have not -- to also answer your question, I have not  
3 developed malware, for example, which is an example of  
4 something we could do because we don't have access to a system  
5 currently. I could develop malware that would circumvent the  
6 checksum result.

7 MR. TYSON: Thank you. I don't have any further  
8 questions.

9 MS. BROGAN: Nothing further, Your Honor.

10 EXAMINATION

11 BY THE COURT:

12 **Q.** Dr. Liu, I just want to follow up on Mr. Tyson's question.  
13 In the course of your consulting and performance of your  
14 security vulnerability assessments, do the techniques that you  
15 just identified meet the assessment of the architectural  
16 structure and documentation of routine method that you use for  
17 assessing vulnerability of the software?

18 **A.** Yes.

19 **Q.** The hacking?

20 **A.** It is usually how we start almost every engagement that is  
21 a little bit more sophisticated is understanding the lay of the  
22 land and using documentation to understand how a system works.  
23 And then our job is to figure out how it doesn't work. So that  
24 involves, of course, needing to know what is right so we can  
25 determine what is wrong.

1     **Q.**     So we are using documentation to identify what is wrong or  
2     potentially wrong or access points. I guess what you are doing  
3     is -- if my understanding is right is that you are looking at  
4     the architecture and documentation to identify specific  
5     vulnerabilities that might be exploited and basically  
6     compromise the functioning of the technology or computer?

7     **A.**     Yes, Your Honor. I think a good way to think about it is  
8     a lot of the Dominion software, a lot of the fundamental  
9     technologies that are being used -- not just with Dominion --  
10    but just everywhere are very similar.

11           And to kind of think about it, the law of physics doesn't  
12    change in Georgia as compared to the State of California. They  
13    all fly. We're using the same technology, the same techniques,  
14    the same approaches.

15           So needing to have hands-on experience with a very, very  
16    specific version of a thing is important in limited cases. But  
17    you can -- you can generally predict how a ball is going to  
18    drop and how gravity will work in California versus Georgia.

19           MR. TYSON: Your Honor, could I ask one follow-up for  
20    that?

21           THE COURT: Yes.

22                               RE CROSS-EXAMINATION

23    BY MR. TYSON:

24    **Q.**     Mr. Liu, in your work with your company and in your past  
25    work in cybersecurity, have you ever encountered a software

1 and/or hardware system that didn't have any vulnerabilities?

2 **A.** I don't think anybody professionally would ever say that  
3 any system is ever free of vulnerabilities. But certainly we  
4 have performed assessments in the past where they have been  
5 very well hardened. And within a certain time frame of testing  
6 that we have undertaken within a time frame that was provided  
7 we were not able to identify any vulnerabilities.

8 MR. TYSON: Thank you.

9 REEXAMINATION

10 BY THE COURT:

11 **Q.** So I guess the question I have is: What you identified as  
12 to the QR code that you said was accessible and that it really  
13 had only been encoded -- did you consider that a fundamental  
14 problem or not or is this just like everyone has -- everyone  
15 has pimples? I hate to use that or every teenager.

16 **A.** I have been asked about the QR code specifically in this  
17 testimony. It is important to understand the broader context  
18 of how these QR codes are being used and the overall system  
19 because it is related. It is related to the installation of  
20 software on the BMD. It is related to how the QR code is being  
21 read on the ICP. It is an entire ecosystem.

22 What I would say is that the intent of the QR codes is  
23 that they represent voter intent. Right? They are  
24 representing -- I think that is the point maybe of what you are  
25 trying to get to.

1           The concern that I would have in a system like this and  
2       what I would tell a client is that the design of the -- the  
3       design of the security system in this situation is not  
4       something I would call secure. I think the votes can be  
5       tampered with. I think the BMD devices really require a much  
6       more in-depth review. It is using very outdated software.

7           I would definitely not recommend -- I would never  
8       recommend anybody use an Android operating system or kernel  
9       that is over half a decade out of date containing known  
10      vulnerabilities. We have clients that, you know, I think are  
11      running an Android 4 -- kernel version 4 or Android version 5.  
12      We have had clients recently just say, oh, the software is  
13      running Android version 7. We're not even going to consider --  
14      don't even bother testing it.

15           So there is a lot of other problems that are going to get  
16      exacerbated.

17           THE COURT: Thank you.

18           Counsel, would you also identify for us what was the  
19      ballot? Was it a Georgia ballot? What was the ballot -- or a  
20      ballot from another jurisdiction using the same type of QR code  
21      because they were using also a Dominion BMD or --

22           MS. BROGAN: Your Honor, it was from what was  
23      produced to us from Fulton County.

24           THE COURT: Okay. Thank you.

25           MR. TYSON: Could I ask one additional follow-up in

1 light of that discussion?

2 THE COURT: Yes.

3 RECROSS-EXAMINATION (Further)

4 BY MR. TYSON:

5 **Q.** So, Mr. Liu, you said that a security analysis would  
6 require a more in-depth review. I just want to clarify. I  
7 believe we have.

8 You have not undertaken that in-depth review at this  
9 point; right?

10 **A.** That is correct. We haven't had access to the software or  
11 the systems as of yet. Although we would welcome the  
12 opportunity to do so.

13 **Q.** And as part of that review, you would include, I'm  
14 assuming, physical security, along with operational usage, in  
15 addition to the software and other factors; correct?

16 **A.** Yes. In this situation, I would definitely include  
17 physical security. My understanding is that there are  
18 mechanisms that the election workers can use to transfer  
19 encryption keys on to the devices with eye buttons and USB  
20 devices.

21 I mean, USB devices is fraught with security concerns. We  
22 actually have a video on our website of research that we  
23 performed three or four years ago where we were able to effect  
24 an attack where you walk up to a digital safe that is being  
25 used at a retail location that is holding cash inside, you

1 know, fast food chains or retail locations. And in 60 seconds,  
2 it pops open the safe after -- 60 seconds after dropping the  
3 USB into the system, the safe opens up and you can remove all  
4 the cash. Those are definitely attack factors I would examine  
5 much more closely.

6 **Q.** So you would agree that physical security is an important  
7 factor when considering the overall security of the election  
8 system; right?

9 **A.** Yes. One of many factors.

10 MR. TYSON: Thank you. I don't have any further  
11 questions.

12 THE COURT: Can this witness be excused?

13 MS. BROGAN: Thank you, Your Honor.

14 THE COURT: Thank you very much. I appreciate  
15 your -- I know you are on a different coast and a whole other  
16 hour. So thank you very much. You will have a prompt start to  
17 your day, to say the least.

18 THE WITNESS: My pleasure. Thank you.

19 THE COURT: All right. Thank you.

20 Who is your next witness?

21 MR. McGUIRE: Your Honor, plaintiffs would like to  
22 call Dr. Coomer, if he is on the line.

23 THE COURT: All right. I need to get a glass of  
24 water. So would you give me one minute before we begin? Thank  
25 you.

1                   **(A brief break was taken.)**

2                   THE COURT: Mr. McGuire, do you want to call your  
3 next witness here?

4                   MR. MCGUIRE: Yes, Your Honor. The plaintiffs would  
5 call Dr. Eric Coomer.

6                   THE WITNESS: I am on the line.

7                   THE COURT: All right. Mr. Coomer, would you raise  
8 your right hand.

9                   **(Witness sworn)**

10                  THE COURT: Thank you very much. State your  
11 location.

12                  THE WITNESS: Location? I'm in Salida, Colorado.

13                  THE COURT: Thank you very much.

14                  MR. RUSSO: Your Honor, one quick matter. The State  
15 defendants are also planning to call Dr. Coomer on our direct.  
16 I understand, of course, plaintiffs would like to cross  
17 Dr. Coomer. But I did want to make that note.

18                  THE COURT: Thank you very much.

19                  MR. MCGUIRE: May I proceed?

20                  THE COURT: Yes.

21                  Whereupon,

22                               ERIC COOMER, PH.D.,

23                  after having been first duly sworn, testified as follows:

24                               CROSS-EXAMINATION

25                  BY MR. MCGUIRE:

1 Q. Dr. Coomer, hi. My name is Robert McGuire. I'm counsel  
2 for the Coalition plaintiffs in this case.

3 First question, can you hear me clearly?

4 A. Yes, I can.

5 Q. Okay. Thank you. You are the director of products  
6 strategy and security for Dominion Voting Systems?

7 A. That is correct.

8 Q. I want to begin by asking you about the plaintiffs'  
9 concerns in this case that the Dominion scanners are not  
10 counting all the votes.

11 Are you and Dominion aware that voter markings that are  
12 obvious votes to human eyes are being disregarded on central  
13 count scanners due to settings that degrade the image quality?

14 A. I do not agree with that statement, no.

15 Q. Okay. You disagree that votes are being discarded by the  
16 scanner that humans would interpret as votes?

17 A. Nothing is being discarded from the system. We are  
18 capturing the percentage fill of the targets for every mark  
19 that is made on the ballot. That has absolutely nothing to do  
20 with the scanner resolution, the DPI setting.

21 Whether a mark is characterized as a ballot vote, an  
22 ambiguous mark, or not a vote is wholly dependent on the  
23 threshold settings of the lower and upper threshold limits as  
24 well as the percentage fill of the target detected by the  
25 system.



1 Q. So does that mean you would not count something as a vote  
2 if to a human eye it looks like a vote?

3 A. No, that is not what it means at all. What it means is  
4 the system is simply scanning the image and detecting the  
5 percentage fill of the target area. Based on the settings, it  
6 will automatically say whether it is a valid counted vote,  
7 whether it is an ambiguous mark, or whether we don't  
8 characterize it as any.

9 There are further processes in the system, mainly  
10 adjudication, which allows secondary review -- voter review for  
11 voter intent issues, which is integral to the system, which is  
12 where you can apply voter intent guidelines and processes to  
13 essentially characterize a vote that the system is not  
14 automatically specifying as a vote.

15 MR. McGUIRE: Okay. Can I ask Clinton to put up  
16 Exhibit PX 7, which was introduced yesterday into evidence?

17 Let's see. Clint, could you scroll to the -- scroll  
18 down just a bit.

19 Q. (BY MR. McGUIRE) So, Mr. Coomer, do you see that where it  
20 says the race for sheriff? It says Theodore "Ted" Jackson. Do  
21 you see that?

22 A. Yes, I do.

23 Q. And you see that mark there?

24 A. Correct.

25 Q. Now, to your eyes as human, does that look like a vote?

1     **A.**    I would say it does, yes.

2     **Q.**    Okay.  Let's go to the next page, please.  Now, you see --  
3     you see there where it says dem sheriff blank contest?

4     **A.**    I do.

5     **Q.**    That means that the Dominion system with the threshold  
6     settings did not interpret that mark which you thought was a  
7     vote to be a vote; correct?

8     **A.**    Not the Dominion system.  The ImageCast central scanner  
9     did not count that as a vote at scan time.

10    **Q.**    And it is not marked as ambiguous, is it?

11    **A.**    We do not include ambiguous marks in the AuditMark.  The  
12    AuditMark is simply showing every vote that was counted as a  
13    vote.

14            There is additional metadata outside of the AuditMark that  
15    we characterize ambiguous marks and also mark densities that  
16    are used in the adjudication system, which is part of the  
17    Dominion system.

18            So when you say the Dominion system is not recognizing  
19    this as a vote or an ambiguous mark, that is an incorrect  
20    statement.

21    **Q.**    Okay.  So the central count scanner, the ICC did not  
22    recognize this mark as a vote?

23    **A.**    That is correct.

24    **Q.**    Okay.  Let's go back up to Page 1, please.  So looking at  
25    the vote for -- and scroll down to Ted Jackson -- the vote for

1 Ted Jackson.

2 You can't tell from this ballot whether or not that mark  
3 went to adjudication, can you?

4 **A.** Not from this image, no.

5 **Q.** Are you aware that a similar dynamic happens for  
6 hand-marked paper ballots that are scanned by the precinct  
7 scanners?

8 **A.** It is slightly different on the precinct scanners.  
9 Because the voter is actually physically feeding in the ballot,  
10 the ImageCast precinct will actually not accept any ballot with  
11 an ambiguous mark on it. So it is a slightly different  
12 behavior between the precinct and the central count.

13 **Q.** And the voter would be alerted if there is an ambiguous  
14 mark; right?

15 **A.** That's correct.

16 **Q.** And the voter would be alerted if there is an overvote;  
17 right?

18 **A.** That's correct.

19 **Q.** Okay. Now, my understanding is that the voter would not  
20 be alerted if there is an undervote; is that right?

21 **A.** That is currently how it is configured in Georgia. The  
22 system is fully capable of notifying voters of undervotes as  
23 well.

24 **Q.** Okay. But as it is configured now in Georgia, the system  
25 doesn't notify voters if there is an undervote in any contest?

1     **A.**    That is correct.  It does --

2     **Q.**    On the precinct count scanners?

3     **A.**    That is correct.  It also does -- I just want to be -- for  
4    completeness, it does warn if the ballot is completely blank.

5     **Q.**    Okay.  And that would be if all the races were empty?

6     **A.**    Correct.

7     **Q.**    Okay.  You understand that the plaintiffs in this case are  
8    arguing to the Court that in-person voting should be conducted  
9    using hand-marked paper ballots as the default voting method?

10    **A.**    I am aware of that, yes.

11    **Q.**    Okay.  Are you aware that the plaintiffs are also arguing  
12    that the high volume scanner settings that you discussed just a  
13    moment ago should be adjusted to ensure that all votes are  
14    counted?  Do you understand that that is the plaintiffs'  
15    contention?

16    **A.**    I know that they want to -- that they are asking for those  
17    thresholds to be changed.  I'm a little confused when you say  
18    that all votes are counted.  Because that is -- that is a  
19    logical fallacy that I am not sure where that -- what that  
20    statement really means.

21    **Q.**    That is because in your eyes a vote is discerned by  
22    whether or not there is a certain percentage of black that the  
23    scanner perceives; correct?

24    **A.**    No, that is not at all what I'm saying.  So the percentage  
25    still is used for the scanners to make the -- let's say the

1 first-pass determination of what is a vote and what is not a  
2 vote. In any system that has hand-marked paper ballots, there  
3 is a process by which you need to consider voter intent. So it  
4 is not -- that is not a simple statement.

5 **Q.** Understood. But you would agree that if a voter's  
6 markings -- however they did it, if a voter's markings do not  
7 exceed your minimum threshold to call it ambiguous, that mark  
8 will be disregarded by the scanner?

9 **A.** It will not be counted as a vote. I take issue with  
10 disregarded. The scanner will not mark it as a vote if it is  
11 above the upper -- if it is not above the upper threshold.

12 If it is between the thresholds, the scanner will mark it  
13 as ambiguous. If it is below the lower threshold, it does not  
14 register as either ambiguous or a vote.

15 **MR. McGUIRE:** Okay. Clint, we can take down the  
16 exhibit, please.

17 **THE COURT:** Let me just follow up on that for a  
18 second. I would normally wait. But since we just had the  
19 exhibit up, I want to understand.

20 So when the vote there was for Mr. -- the candidate  
21 Ted Jackson and it was declared blank on the next -- on the  
22 other page we saw, then that basically means it is not going to  
23 be -- it is not going to be identified as something for  
24 adjudication; is that right?

25 **THE WITNESS:** No, that is incorrect.

1 THE COURT: All right. So then what -- tell me what  
2 is incorrect about that.

3 THE WITNESS: So just because it says blank contest  
4 in the AuditMark does not mean that the system did not identify  
5 that as an ambiguous mark for sending to adjudication.

6 I would have to see more data from this. I can say  
7 that I have a high confidence -- just an anecdotal confidence  
8 that that mark would be sent to adjudication.

9 Again, just to clarify, the AuditMark simply shows  
10 everything that was counted as a vote. There is additional  
11 metadata in the cast vote record, which is the electronic  
12 record, that includes information about ambiguous marks. And  
13 that is the data that is used to determine whether it is sent  
14 to adjudication, not the audit.

15 **Q. (BY MR. MCGUIRE)** If I may, Mr. Coomer, if the vote -- if  
16 the --

17 **A.** Dr. Coomer.

18 **Q.** I'm sorry. Dr. Coomer. Apologies.

19 If the ballot in this particular case had been adjudicated  
20 to be a vote, would that adjudication show up on this  
21 AuditMark?

22 **A.** Yes, it would.

23 **Q.** And we don't see it here, do we?

24 **A.** Yeah. I don't know where this image came from. So I'm  
25 not sure that this is either post- or pre-adjudication. So I

1     can't make any statements on that.

2     **Q.**    But if it had been adjudicated in the course of a normal  
3     election process, you would have seen that on the AuditMark in  
4     front of us; right?

5     **A.**    Yes.    Yes.

6     **Q.**    Okay.   So I would like to turn to precinct scanners, and  
7     we can take that exhibit down.

8             Dr. Coomer, Dominion's precinct scanners are generally  
9     used to scan BMD ballots; right?

10    **A.**    Can you be more specific?

11    **Q.**    Well, the precinct -- in the precincts most of the ballots  
12    that are scanned on the precinct scanners are ballots printed  
13    from BMDs?

14    **A.**    In Georgia, that is a correct statement.

15    **Q.**    But the scanners -- the precinct scanners are capable of  
16    scanning and tabulating in the precincts hand-marked paper  
17    ballots, are they not?

18    **A.**    Correct.

19    **Q.**    Now, you recently submitted a declaration at Document  
20    834-1.  I'm going to read to you -- I can show it to you.  I  
21    don't actually have it as an exhibit.  But I can share my  
22    screen and show it to you so you can follow along with what I'm  
23    reading, assuming that I can do this.

24             If you can tell me when that comes up for you.

25    **A.**    I can see it now.

1     **Q.**    I have highlighted there Paragraph 5.  And it says, there  
2     are a limited number of ballot printers in the United States  
3     that are qualified to print absentee and mail ballots for use  
4     in the Dominion Democracy Suite.  The total number of qualified  
5     printers is 34, and there is only one qualified printer in the  
6     State of Georgia.

7           Did I read that correctly?

8     **A.**    Yes, you did.

9     **Q.**    Okay.  Now, you wrote that to support the State's argument  
10    that it is not feasible for Georgia to print enough ballots to  
11    conduct a statewide election in which in-person voters use  
12    hand-marked paper ballots; correct?

13    **A.**    I can say that I wrote that because that is the fact of  
14    the state of qualified printers.

15    **Q.**    Okay.  Now, did you contact any of the 34 qualified  
16    printers to ascertain whether there was enough printing  
17    capacity to print enough paper ballots to run a statewide  
18    election in Georgia?

19    **A.**    Not specifically.  But I can say that we are having daily  
20    calls with our printers due to capacity issues in general for  
21    the entire election in November.

22    **Q.**    But you haven't asked any of them about their ability to  
23    fill a need in Georgia if this Court were to order hand-marked  
24    paper ballots?

25    **A.**    Not specifically for Georgia, no.



1 Q. Okay. What makes a printer, quote-unquote, qualified to  
2 print absentee and mail ballots?

3 A. We have a whole qualification process. It is basically a  
4 set of tests, quality controls, access controls, various things  
5 that we assess for a given printer. They have to do a set of  
6 test ballots, and we have to make sure that they can accurately  
7 print and reproduce our ballots for accuracy and our standards.

8 Q. And so that is a Dominion qualification?

9 A. Yes, it is.

10 Q. Okay. And what legal requirement do you know, if you  
11 know, requires Georgia to use only a qualified -- ballots that  
12 are produced by a qualified ballot printer?

13 A. I'm not aware of any Georgia statute that requires a  
14 Dominion qualified printer. But I can say that we as a company  
15 would not use an unqualified printer.

16 Q. Okay. Now, the precinct tabulators, they are ordinary  
17 off-the-shelf printers; right?

18 A. I'm sorry. Could you repeat that.

19 Q. Yes. The precinct tabulators that are used in Georgia,  
20 they are hardware that is ordinary off-the-shelf hardware;  
21 right?

22 A. No. The tabulator is proprietary Dominion -- the  
23 ImageCast Precinct is a proprietary Dominion product.

24 Q. Okay. So are you aware that plaintiffs have had the  
25 opportunity to test one of those printers since last Friday?

1     **A.**     I am aware that representatives for the plaintiffs have  
2     access to the precinct equipment. I can't characterize what a  
3     test is.

4     **Q.**     Okay. Would you -- would it surprise you to learn that  
5     the plaintiffs --

6             MR. TYSON: Your Honor, I'll object right here. I  
7     think we're getting into the scope of the testing again. And  
8     we went over this yesterday. I don't think this is the proper  
9     place to bring this in.

10            THE COURT: I don't know that he is getting into  
11     testing.

12            MR. MCGUIRE: Correct, Your Honor. If I may just ask  
13     one or two questions, it will be clear. I'm getting to  
14     feasibility.

15     **Q.     (BY MR. MCGUIRE)** Are you aware that the Dominion precinct  
16     scanner will accept and scan ordinary photocopies of ballots?

17     **A.**     I'm aware that the precinct scanner will accept a valid  
18     ballot.

19     **Q.**     Okay. Are you aware that it will accept a photocopy of a  
20     valid ballot?

21     **A.**     Potentially, yes.

22     **Q.**     Okay. So even if there weren't capacity among your  
23     qualified printers, wouldn't it be possible for any commercial  
24     printer to provide acceptable ballots for Georgia to use?

25     **A.**     No, I can't agree with that statement at all. No.

1 Q. Okay. Let's switch to the central scanning. I'm going to  
2 ask -- let me go back to -- am I still sharing my screen with  
3 you? Do -- you still?

4 A. Yes, you are.

5 Q. I'm going to highlight Paragraph 4.

6 In Paragraph 4, you wrote, scanner threshold settings for  
7 the Dominion Democracy Suite that Georgia purchased are not set  
8 on each individual scanners. Instead, scanner threshold  
9 settings are set when the voting database is built. Users are  
10 not able to change the threshold settings without being trained  
11 to do so and with the appropriate application access  
12 privileges.

13 Did I read that right?

14 A. Yes, you did.

15 Q. Okay. We can take that -- actually, I can take that down.  
16 Let me just do that.

17 Dr. Coomer, does this statement apply equally to precinct  
18 scanners and high capacity scanners or just one or the other?

19 A. No. It is for both.

20 Q. Okay.

21 A. There's actually individual settings for each scanner  
22 type.

23 Q. Okay. Now, I understand from your statement in your  
24 declaration here that --

25 THE COURT: Could you give me the document number

1 again? I'm sorry.

2 MR. McGUIRE: Yes, Your Honor. It is 834-1.

3 **Q. (BY MR. McGUIRE)** Now, Dr. Coomer, do you dispute  
4 whether -- is it your contention that counties could not change  
5 their central scanner settings before the November election if  
6 this Court orders it?

7 **A.** No, that is not my statement at all.

8 **Q.** So that -- and that is not a statement you would make?

9 **A.** No.

10 **Q.** Okay. So if this Court orders it, the settings on the  
11 central count scanners could be changed feasibly?

12 **A.** Yeah. Before the project is built. I mean, we are in the  
13 midst of building the project. So there is -- there is a time  
14 when you can't easily change the settings.

15 **Q.** Okay. I'm going to ask you next about the version of  
16 Democracy Suite that is running in Georgia. That version is  
17 designated as Democracy Suite 5.5-A and parenthesis GA;  
18 correct?

19 **A.** Yes.

20 **Q.** Now, is that version certified by the EAC?

21 **A.** Yes, it is.

22 **Q.** It is certified under that name 5.5-A parenthesis GA?

23 **A.** I believe the official certification is under 5.5-A, which  
24 is the same as 5.5-A parenthesis GA.

25 **Q.** If it is the same, then why does it have a different

1 designation?

2 **A.** I think we did that when we submitted it to the Georgia  
3 certification effort.

4 **Q.** Okay. So it wasn't because the software for the ImageCast  
5 central scanner changed?

6 **A.** No.

7 **Q.** Okay. So the ImageCast central scanner software under  
8 5.5-A (GA) is the same software that the EAC certified under  
9 5.5-A?

10 **A.** That's correct.

11 **Q.** Okay. Dr. Coomer, the original delivery date for counties  
12 in Georgia to receive the Dominion EMS servers was August of  
13 2019; right?

14 **A.** If you say so. I don't -- I don't know offhand by memory  
15 all of the operational delivery dates of systems across the  
16 U.S.

17 **Q.** Now, there has been evidence in this case that those  
18 deliveries were -- many of them were delayed until February and  
19 March of 2020, so six months approximately.

20 Do you know anything about that?

21 **A.** Only peripherally. Again, I'm not -- I'm not the  
22 operations implementation expert.

23 **Q.** What is your understanding briefly of why that delay  
24 happened?

25 **A.** Again, I don't -- I don't have specifics on that. Nothing

1 that I could attest to in court.

2 **Q.** Okay. So I would like to switch gears now. We talked  
3 about you being Dominion's director of product strategy and  
4 security.

5 Is that a role that requires you to have a technical  
6 background?

7 **A.** Yes.

8 **Q.** And does it require you to have familiarity with the  
9 functionality of the devices that Dominion is selling now?

10 **A.** Intimately.

11 **Q.** Okay. So you are intimately familiar with the  
12 functionality of the EMS software, for example?

13 **A.** Yes, I am.

14 **Q.** And with the ICX or ballot-marking device?

15 **A.** Correct.

16 **Q.** And with the central count scanners?

17 **A.** Correct.

18 **Q.** And with the precinct scanners?

19 **A.** Correct.

20 **Q.** Now, all of these devices run on top of operating systems;  
21 is that right?

22 **A.** That's correct.

23 **Q.** Okay. Dominion doesn't write the underlying operating  
24 system, does it?

25 **A.** No, we do not.

1 Q. Okay. You would agree, wouldn't you, that none of  
2 Dominion's software could be considered secure if an attacker  
3 could achieve control of the underlying operating system;  
4 correct?

5 A. I'm not -- I'm not sure. Can you clarify that question?  
6 It is a little vague.

7 Q. Sure. So the software tells the operating -- at its most  
8 basic level, the software tells the operating system to do  
9 things and the software stands between the user and the  
10 operating system; correct?

11 A. Sort of. The operating system assists software in  
12 operating.

13 Q. Since Dominion didn't write the operating system, the  
14 operating system is separately -- it is underlying all of the  
15 Dominion software on the hardware; correct?

16 A. That is how computer systems work, yes.

17 Q. And so if someone were able to compromise the operating  
18 system by, for example, exploiting a vulnerability that hasn't  
19 been patched, they could take over the machine on which the  
20 Dominion software is running; correct?

21 A. It depends on the vulnerability.

22 Q. If they were able to do that, obviously depending upon the  
23 vulnerability, that would compromise the security of any  
24 software running on that compromised operating system; right?

25 A. Potentially. Again, it depends. That is a very

1 open-ended question.

2 **Q.** And you would agree that the logs that are generated by  
3 Dominion software do not -- I'll talk about the EMS in  
4 particular.

5 The logs generated by Dominion's EMS software do not  
6 capture events that occur in the underlying operating system;  
7 is that true?

8 **A.** Not necessarily. So we do have a variety of logs, and  
9 some operating system level events are captured in the logs.

10 **Q.** Okay. Some operating system level events are not  
11 captured; right?

12 **A.** Correct.

13 **Q.** Okay. And the logs themselves are editable; correct?

14 **A.** It depends on what you mean by editable, and it depends on  
15 which logs you are talking about. So --

16 **Q.** Okay. To close out this topic, would you agree that one  
17 of the goals of logic and accuracy testing of equipment is to  
18 do some -- some measure of confirmation that the equipment is  
19 working properly?

20 **A.** Absolutely.

21 **Q.** Okay. So now what I would like to do is pull up  
22 Exhibit 8 -- PX 8. And I would ask if Clint can do it. I  
23 can't pull that up. And if you could go to Page 6, please.

24 Now, Paragraph 9 is a long paragraph, Dr. Coomer. But I  
25 want to point you to -- there is some language in there. I'm



1 just going to read it. It is about -- oh, it is sort of the  
2 last sentence there. It begins pre-logic.

3 THE COURT: Could you give me the document number  
4 again.

5 MR. McGUIRE: Certainly, Your Honor. It is 821-1.  
6 And it is also Plaintiffs' Exhibit 8, which we won't move to  
7 introduce because it is in the record.

8 **Q. (BY MR. McGUIRE)** Dr. Coomer, Paragraph 9 says, pre-logic  
9 and accuracy testing, Pre-LAT, is performed each election on  
10 every machine to verify that the target locations on  
11 hand-marked ballots and the barcodes on BMD-marked ballots  
12 correspond correctly to the choices represented on the ballots  
13 and the digital cast vote records.

14 Did I read that right?

15 **A.** Yes, you did.

16 **Q.** Are you aware that the Georgia Secretary of State and the  
17 State Election Board only required testing of one vote position  
18 on each machine?

19 **A.** No, I'm not aware of that.

20 **Q.** Let's go if we could, please, Clint, to Page-- I think  
21 we're already on it, Page 6.

22 So I would like to direct your attention, Dr. Coomer, to  
23 Paragraph 10 at the bottom. It says, every ballot, hand-marked  
24 or BMD-generated, scanned on a Democracy Suite tabulator  
25 creates a digital image of the front and back of the ballot.

1 Did I read that right?

2 **A.** Yes.

3 **Q.** So does that mean that both precinct and central count  
4 scanners create digital ballot images?

5 **A.** That's correct.

6 **Q.** And precinct scanners save -- they have the capacity to  
7 save those ballot images; correct?

8 **A.** Both devices do, yes.

9 **Q.** Okay. And whether or not they save the ballot images is  
10 governed by tabulator settings; is that right?

11 **A.** Yes. There is a setting that can determine that.

12 **Q.** So there is an option that you can turn on to save the  
13 ballot images and an option that you can turn off to not save  
14 ballot images?

15 **A.** There is. I can't say for certain that that -- that that  
16 option is available in the Georgia version.

17 **Q.** So if you -- in a precinct scanner when ballot images are  
18 set to be saved, the scanner saves those to the compact flash  
19 memory card; right?

20 **A.** Correct. It actually saves them to two compact flash. So  
21 we have redundant storage.

22 **Q.** Does one of those go to the tabulating location on  
23 election day?

24 **A.** Generally, that is how it works. It depends on individual  
25 counties how they transport that.

1 Q. Okay. And the other card remains with the scanner?

2 A. Generally, that is how it is done. But, again, that is  
3 county-specific procedures.

4 Q. Okay. And is the information on those two cards a mirror  
5 image of each other, or are there differences?

6 A. As far as the vote data, they are mirror images.

7 Q. Okay. What about other data?

8 A. So generally only one -- well, again, it depends on  
9 county-specific procedures. But one card may -- only one card  
10 may have the election definition because it only needs one copy  
11 of that to define the election definition.

12 Q. And is it your testimony that neither copy of the  
13 ballot -- neither -- neither compact flash card contains time  
14 stamps associated with ballot images?

15 A. That's correct.

16 Q. So there is -- there is no time stamp added by Dominion  
17 software when the ballot is scanned?

18 A. There is no specific time stamp. I believe at the  
19 operating system level, there is a generic time stamp that is  
20 associated.

21 Q. And that would --

22 A. They are the same for all data. So it is -- I believe it  
23 is, you know, 12:01 A.M. of the day.

24 Q. So do you -- that last bit confused me. So are you saying  
25 that the operating system does not record an accurate file

1 creation date in its metadata for the ballot images?

2 **A.** That's correct.

3 **Q.** It just records -- all ballot images are recorded in the  
4 operating system as having the same file creation date?

5 **A.** Yeah. I mean, again, that is sort of the -- that is sort  
6 of the limitation of the operating system. It -- by design, it  
7 associates some date with everything that is created in the  
8 system. And we ensure that that is a nonspecific date to  
9 preserve voter privacy.

10 **Q.** Okay. Privacy is a good segue to the next topic. Are you  
11 aware of concerns in Georgia that the BMD touch screens are so  
12 large that they can reveal a voter's selections to anyone with  
13 a line of sight to the screen?

14 **A.** I have heard that statement made.

15 **Q.** Do you disagree with it?

16 **A.** Yes.

17 **Q.** Why do you disagree with it?

18 **A.** Because that is -- it has no context. There are many  
19 things that can be done to ensure that -- regardless of the  
20 size of the screen that the voting session is private. It is  
21 not inherent to the system.

22 **Q.** Are you aware that the State has adopted guidelines for  
23 polling place setup that attempts to address this problem?

24 **A.** I have heard that statement. I am not aware -- I'm not  
25 specifically familiar with any of the mitigations that they

1 propose.

2 **Q.** Do you know whether Dominion was involved in the adoption  
3 of those guidelines or their formulation?

4 **A.** Not specifically. I don't know that for a fact. Again,  
5 I'm not -- I'm not the main operations guy.

6 **Q.** Finally, I want to ask you about Dominion's involvement in  
7 Fulton County's delivery of the equipment I referred to earlier  
8 that the plaintiffs obtained in discovery in this case.

9 I believe you said you were aware -- I believe you said  
10 you were aware generally that the Court -- that Dominion  
11 equipment was provided to the plaintiffs by Fulton County; is  
12 that right?

13 **A.** Correct.

14 **Q.** You are aware that the -- maybe you are not aware of the  
15 specific date. But would it surprise you to learn that it was  
16 provided on last Friday, September 4?

17 **A.** Yeah. I think the deadline was last Friday at 5:30  
18 Eastern Time.

19 **Q.** Okay. Did you know that a Dominion tech named Mitch  
20 configured the equipment for a test election in the morning of  
21 September 4 before that equipment was given to the plaintiffs?

22 **A.** No, I'm not aware of that.

23 **Q.** Okay. Who would -- you aren't the person who would have  
24 been supervising that, are you?

25 **A.** No.

1 Q. Okay. Would it surprise you to learn that the precinct  
2 scanner that the plaintiffs received was not configured to save  
3 ballot images?

4 A. I would be surprised if that is the case. I have no  
5 reason to believe that that is fact.

6 Q. Okay. Would it surprise you to learn that the BMD screen  
7 that the plaintiffs received shows -- when we were conducting  
8 the test election shows no parties for the candidates, only  
9 candidate names?

10 A. Yeah. That's pretty standard.

11 Q. To not show parties?

12 A. Yeah. That is a state-specific statute on whether that  
13 happens. There is plenty of elections -- many, many, many test  
14 elections, many real elections that do not display party  
15 information on candidates. So I'm not at all surprised about  
16 that.

17 Q. What would you make of there being a difference between  
18 what the screen says to voters before they cast their -- before  
19 they print their ballot, if there is a difference between it  
20 saying cast ballot on the test equipment versus print ballot on  
21 normal Georgia equipment? Would that difference mean anything  
22 to you?

23 A. No, it wouldn't. There's lots of localizations on the  
24 system because various jurisdictions like to tailor those voter  
25 messages.

1 Q. Okay. And if ballots -- if the touch screen doesn't show  
2 the parties associated with the candidate, would you expect the  
3 ballots that are printed by that BMD to also not show the  
4 parties?

5 A. No. It depends on how the data is defined. So, again,  
6 that is all driven on state requirements for ballot  
7 information.

8 So if you are trying to say that that shows that something  
9 is wrong in the configuration of the system, that is not a  
10 correct statement.

11 Q. Okay. So if any of the things I'm talking about are not  
12 consistent with what Georgia law requires or what Georgia  
13 ballots look like, you would agree with me that the test  
14 configuration that the plaintiffs were given isn't a Georgia  
15 configuration?

16 A. No, I wouldn't say that at all. Because when you define  
17 configuration, that is how the system operates. What is  
18 displayed on the screen is not a configuration. That is just  
19 data.

20 Q. Understood. The configuration determines what is  
21 displayed on the screen; correct?

22 A. No.

23 Q. I thought you said earlier that --

24 (Unintelligible cross-talk)

25 A. You are asking me how the system operates. So when you

1 lay out a screen, when you lay out any ballot, whether it is a  
2 hand-marked paper ballot or a screen ballot, part of the  
3 project definition is determining what fields are displayed.  
4 That is not a configuration.

5 **Q. (BY MR. McGUIRE)** Okay.

6 **A.** That is not how it, quote-unquote, operates. It is still  
7 going to create ballots the same way. It is still going to  
8 read ballots the same way. It is simply what is displayed on  
9 the screen. And that is just the data.

10 So test projects we often don't include -- you know, for  
11 instance, some jurisdictions, certain offices, not only do you  
12 have to show a party, you have to show a physical address.  
13 That is just one example.

14 It doesn't change how the system operates when you choose  
15 that candidate whether the party or the address is displayed on  
16 the screen. That is just additional metadata that is displayed  
17 to the voter.

18 **Q.** So your position is that the fact that it behaves  
19 differently in a visual way from the way Georgia -- the way it  
20 would behave in an actual Georgia election isn't an indication  
21 that it is going to actually behave differently in a way that  
22 matters?

23 **A.** It is not how it behaves. It is how the election  
24 definition was defined. It is not behavior.

25 **Q.** Is there -- are you aware that Fulton County told the



1 plaintiffs that the equipment they were providing would have  
2 all of the same settings that are used in a normal Georgia  
3 election?

4 **A.** No. I have no idea of the communication between Fulton  
5 and the plaintiffs' representatives.

6 **Q.** Okay. Can you think of any reason why a Dominion tech  
7 would change the configuration away from a normal Georgia  
8 election, if that happened?

9 **A.** I have no idea because I have no knowledge of how this  
10 equipment was prepared or anything like that.

11 **Q.** Do you agree that the plaintiffs would be unable to test  
12 the functioning of an election -- of election equipment under  
13 election conditions if they are not given equipment that has  
14 the same settings that apply to election conditions?

15 **A.** I would agree with that absolutely, yes.

16 **Q.** Okay. Just as a general question, do Dominion personnel  
17 have the same level of access to Dominion EMS servers and other  
18 system components in all of Georgia's counties that they have  
19 in Fulton County?

20 **A.** I have -- I can't answer that at all.

21 **Q.** Okay.

22 **A.** One, I don't know of access any Dominion representative or  
23 contractor had in Fulton County, nor do I know what each  
24 individual has across the state.

25 **Q.** So just operationally, you're not really able to provide a

1 lot of detail on that?

2 **A.** No, not specifically. I would have to actually talk to  
3 every single representative in every single county.

4 MR. McGUIRE: Okay. Your Honor, I have nothing  
5 further on direct.

6 THE COURT: All right. Mr. Russo, are you reserving  
7 questions for later?

8 MR. RUSSO: I mean, Your Honor, if you would like for  
9 us to proceed now, I think -- you know, I'm happy to go forward  
10 now --

11 THE COURT: Well, that is fine.

12 MR. RUSSO: -- on our direct, yes.

13 THE COURT: Are you -- but then you are basically  
14 giving up calling him as a witness during your portion?

15 MR. RUSSO: That is fine --

16 THE COURT: That is fine.

17 MR. RUSSO: -- if that would help the Court move  
18 faster.

19 THE COURT: I think it will. I think it will.

20 MR. RUSSO: I'm happy to do that.

21 THE COURT: I had a few questions that were hanging  
22 from what was spoken. But I'll just hold them in reserve.  
23 Maybe it will get clarified during your direct.

24 MR. RUSSO: That is fine.

25 DIRECT EXAMINATION

1 BY MR. RUSSO:

2 **Q.** Good morning, Dr. Coomer. I want to first touch on your  
3 background. What is your educational background?

4 **A.** I have a bachelor of science in engineering physics from  
5 Rensselaer Polytechnic Institute. And I have a master's and  
6 Ph.D. in nuclear physics and plasma physics from the University  
7 of California Berkeley.

8 **Q.** Earlier you testified to your current position at Dominion  
9 as the director of product strategy and security.

10 What are your responsibilities in that position at  
11 Dominion?

12 **A.** So I have several. But my main responsibility is the  
13 design and development of new products based on both market and  
14 customer requests and requirements and also, you know, future  
15 useful products.

16 **Q.** And for the benefit of the Court, can you walk through  
17 your background working in or with election systems?

18 **A.** Sure. I actually started in 2005 with Sequoia Voting  
19 Systems. I was a database and software developer. After three  
20 years, I became the vice president of engineering for Sequoia  
21 Voting systems.

22 That company was acquired in 2010 by Dominion Voting  
23 Systems, who I'm with currently. I was initially the vice  
24 president of U.S. engineering for Dominion. And starting  
25 around, I believe it was, 2014, I migrated to my current role.

1 Q. And at a high level, can you explain what types of  
2 experience you have had in developing election systems?

3 A. Yes. So I have basically from every aspect. So I have  
4 written direct code for various election components. I  
5 designed from the ground up the entire adjudication system that  
6 is used in the Dominion products right now. And I also provide  
7 primary election support for several of our largest and most  
8 complex customers.

9 Q. Do you recall previously testifying in this case or I  
10 should say at one of the hearings?

11 A. Yes, I do.

12 Q. I recall you weren't necessarily fully cross-examined,  
13 direct examined.

14 But has any of your testimony changed since that time?

15 A. It has not.

16 Q. Dr. Coomer, I would like to turn --

17 MR. RUSSO: I'm sorry. Is that a statement?

18 MR. MCGUIRE: No. I'm sorry. I cleared my throat.  
19 I'll mute myself.

20 Q. (BY MR. RUSSO) Dr. Coomer, I would like to turn to the  
21 Dominion election system deployed in Georgia. Now, there are  
22 various components to that system.

23 So we know what you are referring to and we are discussing  
24 the Dominion system, can you please tell us what for you the  
25 Dominion system consists of?

1     **A.**    Yes.  So at the heart of it is the primary back office  
2     election management system.  That is generally a server client  
3     configuration.  It is on an isolated network.  That is where  
4     all of the ballot definition and ballot programming is done.  
5     That is also where all of the results are consolidated and  
6     recorded from after election day.

7           And then we have the precinct equipment, voting equipment.  
8     That includes the e-pollbooks, the ICX ballot-marking device,  
9     and the ICP precinct tabulator scanner.  And then we also have  
10    the central count system, the ICC, for counting and tabulating  
11    absentee and mail-in ballots.

12   **Q.**    What types of certifications is Dominion required to go  
13    through before deploying its election systems in any  
14    jurisdiction in the United States?

15   **A.**    So that is highly state-dependent.  Some states require a  
16    federal certification at the EAC, Election Assistance  
17    Commission.  Some require just an EAC compliant VSTL test  
18    report, so voting system test laboratory report.  Some require  
19    a combination of federal and state certifications.  And some  
20    states require just a state certification alone, like  
21    California.

22   **Q.**    Are you aware of the certifications that the Dominion  
23    system went through before being deployed in Georgia?

24   **A.**    Yes, I am.

25   **Q.**    And can you tell us what those are?

1     **A.**    Yes.  So, again, it is -- Georgia requires an actual EAC  
2     certified system.  And then there is a state certification  
3     effort on top of that.

4     **Q.**    Okay.  And can you describe the EAC certification process  
5     for the Court?

6     **A.**    I can give a really brief summary.  It would take most of  
7     the day to describe the entire certification process.

8     **Q.**    At a high level.

9     **A.**    Yeah.  The systems are tested to what is called the VVSG,  
10    the Voluntary Voting System Guidelines.  1.1 is the current  
11    draft.  That covers a variety of tests, both functional and  
12    accuracy tests.  There are also reliability tests, temperature  
13    power tests of the equipment.

14           It is a wide range of tests that cover everything from the  
15    physical devices, how they behave in various temperature  
16    conditions, functionally how the systems behave, and the  
17    accuracy of the systems.

18    **Q.**    If Dominion wanted to make changes to its system, would  
19    that require recertification?

20    **A.**    It depends on the level of change.  So the EAC  
21    certification process has what is called an ECO, engineering  
22    change order, process for changes that are deemed what is  
23    called de minimus.  They do not require a full recertification  
24    effort.  Changes that are not identified as de minimis require  
25    some recertification effort all the way up to a full campaign.

1 Q. What would be some examples of a change that would simply  
2 require an ECO?

3 A. Generally, those are things like new versions of hardware.  
4 So if we have a laptop model certified in the system and that  
5 laptop model becomes end of life, we identify a new model.  
6 That can be certified under the ECO process.

7 Recently, the EAC certification has also extended to what  
8 is called a de minimis software change. So if a code change is  
9 identified as de minimis or characterized as de minimis and  
10 this is by the test lab itself, that software change could be  
11 made without a full recertification effort.

12 That is for something like literally a one-line  
13 configuration change in some config file that would have no  
14 material impact on the system.

15 Q. Now, on plaintiffs' counsel's cross-examination, you  
16 discussed the different Democracy Suite versions. And the  
17 Democracy Suite version 5.5 versus 5.5-A was brought up.

18 What is the difference between those two versions?

19 A. Actually, I believe on direct we just talked about 5.5-A  
20 and 5.5-A (GA).

21 Q. I'm sorry. Then I'll ask you: Is there a difference  
22 between 5.5 and 5.5-A?

23 A. Yes. So 5.5 was our initial EAC certified version, and  
24 then we went in with 5.5-A, which is the version that is also  
25 federally certified and the one that is in Georgia.

1           There was a specific functional change on the ImageCast X  
2     between those two versions.

3     **Q.**   And is there any difference in the firmware between 5.5  
4     and 5.5-A?

5     **A.**   On the ImageCast X, yes, there is.

6     **Q.**   But not on the rest of the system?

7     **A.**   No.

8     **Q.**   And when you said it went through the certification  
9     process, was that the ECO process or was that a  
10    recertification?

11    **A.**   No. Between 5.5 and 5.5-A at the EAC, that was a full  
12    recertification.

13    **Q.**   Okay. Now, Dr. Coomer, when you previously testified in  
14    this case in March of this year, you --

15           THE COURT: Let me just stop you for a second. The  
16    change in the ImageCast system -- just so I'm not just having  
17    this hanging -- that was in the Georgia system or in the first  
18    5.5-A?

19           THE WITNESS: So between 5.5 -- which 5.5 has never  
20    been part of the Georgia system.

21           THE COURT: Right.

22           THE WITNESS: We have a 5.5 system and a 5.5-A  
23    system. The only difference between those two systems is a  
24    code change on the ImageCast X BMD system. But 5.5-A and what  
25    people are referring to as 5.5-A, parenthesis Georgia, (GA) are



1 identical.

2 THE COURT: And 5.5-A is what you had -- what you  
3 tested and you had certified?

4 THE WITNESS: We actually certified -- somebody just  
5 put up a --

6 THE COURT: Yeah. I just saw. It is somebody --

7 **(There was an interruption in the proceedings,**  
8 **and the parties resumed with a telephone**  
9 **conference, as follows:)**

10 THE COURT: [REDACTED]

11 [REDACTED]  
12 COURT REPORTER: [REDACTED]

13 THE COURT: [REDACTED]

14 [REDACTED]  
15 [REDACTED]

16 MR. CROSS: [REDACTED]

17 MR. BROWN: [REDACTED]

18 MR. McGUIRE: [REDACTED]

19 MS. RINGER: [REDACTED]

20 [REDACTED]  
21 MR. RUSSO: [REDACTED]

22 MR. TYSON: [REDACTED]

23 MR. MILLER: [REDACTED]

24 [REDACTED]  
25 THE COURT: [REDACTED]

1 [REDACTED]  
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MR. BROWN: [REDACTED]

MR. RUSSO: [REDACTED]

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MR. BROWN:

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MR. RUSSO:

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MR. CROSS:

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MR. BROWN:

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LAW CLERK COLE:

**(The telephone conference proceedings were**

1                   **thereby concluded at 11:30 A.M., and all**  
2                   **parties returned back to the Zoom conference.)**

3           MR. MILLER: Your Honor, I did want to say that I'll  
4 be emailing exhibits to Ms. Cole for Mr. Harvey and Mr. Adida  
5 shortly.

6           THE COURT: All right.

7           MR. MILLER: I'll mute now.

8           MS. RINGER: This is Cheryl Ringer. Can you forward  
9 your exhibit for Mr. Barron?

10          MR. BROWN: I will.

11                   **(There was a brief pause in the proceedings.)**

12          THE COURT: All right. So Mr. Brown, Mr. Cross,  
13 Mr. Russo, do you have everyone in your team -- I mean, you are  
14 the people I can see right now. I also can see Mr. McGuire,  
15 but I'm trying to not be repetitive.

16               Everyone in your respective team who needs to be here  
17 is present?

18          MR. BROWN: Yes, Your Honor.

19          THE COURT: All right. Are we ready?

20          MR. RUSSO: We have Dr. Coomer and me. And so I  
21 think we are good for now.

22          THE COURT: Very good. Ms. Cole, are you ready to  
23 begin?

24          LAW CLERK COLE: Yes.

25               Is there any attorney who has not been unmuted that

1 needs to be unmuted? For example, Ms. Ringer, for Fulton  
2 County, right now she is muted. I don't know if she needs to  
3 be unmuted or not.

4 MS. RINGER: Ms. Cole, I'm fine. Thank you.

5 THE COURT: I think that what we have to manually now  
6 do the -- remember the muting and not muting. So if it ends up  
7 a problem, you will have to text one of your colleagues who is  
8 unmuted to raise the issue.

9 All right. Ladies and gentlemen in the remote  
10 audience, obviously we had a significant problem with somebody  
11 either zooming in and sharing the destructive memes or else  
12 somebody present intentionally or inadvertently shared a video  
13 with the rest of the people present.

14 So we are now sort of at a more controlled level.  
15 Things may be a little more awkward because now Ms. Cole on  
16 behalf of the Court is going to have to show each of the  
17 exhibits rather than having counsel do it.

18 And we're ready to begin, and we will not be taking a  
19 lunch break. We will just simply proceed and take smaller  
20 breaks along the way.

21 All right. I think that counsel for the State was  
22 examining Mr. Coomer, if I remember. But at this point, I'm  
23 not 100 percent sure. I think that is correct.

24 Go ahead.

25 MR. RUSSO: I think that is right, Your Honor. I

1 believe we were discussing and you were having some dialogue  
2 with Dr. Coomer about the version 5.5-A with the Georgia  
3 notation behind it, and that is the testimony now. The record  
4 is clear already.

5 Did you have additional questions on that?

6 THE COURT: No. I had something. I'll get back to  
7 it. That's fine.

8 MR. RUSSO: Thank you.

9 **Q. (BY MR. RUSSO)** Dr. Coomer, welcome back. When you  
10 previously testified in this case in March of this year, you  
11 discussed transition from Georgia's old DRE GEMS system to the  
12 new Dominion system.

13 Do you recall that?

14 **A.** Yes, I do.

15 **Q.** And you testified at that time that there is no source  
16 code or software from the GEMS system that is carried over into  
17 the new Dominion system.

18 Do you recall that?

19 **A.** I do recall that, and that is correct.

20 **Q.** Okay. And has your testimony on that changed?

21 **A.** Not at all.

22 **Q.** Okay. Is Dominion's system in Georgia a ground-up  
23 isolated system?

24 **A.** Yes, it is.

25 **Q.** And can you describe or explain to the Court what it means

1 for Dominion's system to be a full end-to-end system?

2 **A.** Yes. So the Democracy Suite system is a full end-to-end  
3 election management system. So it defines the geopolitical  
4 data, precincts, districts, the election specific data contest  
5 candidates, ballot styles. It manages all of the voting  
6 terminals and tabulators, and it also consolidates and reports  
7 all of the results as well.

8 **Q.** And by being a ground-up isolated system, never kind of  
9 mixing two different issues here, the full end-to-end system  
10 from the ground up -- can you explain what a ground-up isolated  
11 system is?

12 **A.** Yeah. I mean, the Dominion Suite product is a wholly  
13 developed Dominion system. It does not use any legacy  
14 components from past voting systems. And it is a  
15 self-contained, self-functioning election management system and  
16 tallying tabulation system.

17 **Q.** We have heard about the hardening of the EMS. Is the EMS  
18 hardened to any benchmarks?

19 **A.** Yeah. So we harden the servers and the work stations to  
20 the NIST benchmarks for the operating system that is installed  
21 on those servers and work stations.

22 **Q.** And can you tell us about the NIST benchmark standard?

23 **A.** Yeah. I mean, so NIST puts out essentially guidelines  
24 on -- benchmark guidelines on hardening scripts and what  
25 aspects of operating systems should be configured and how they

1 should be configured to be considered hardened. And we apply  
2 all of those through our hardening scripts.

3 **Q.** And do you know whether the NIST benchmark hardening  
4 requires removal of all applications that are not necessary for  
5 the functioning of the EMS?

6 **A.** That is not specifically spelled out in those benchmarks,  
7 no.

8 **Q.** And in your opinion, is the NIST benchmark considered the  
9 gold standard?

10 **A.** I would think it is, yes.

11 **Q.** And, Dr. Coomer, I would like to turn to Dominion's  
12 ballot-marking devices specifically. And we all, I think, are  
13 familiar with what the ballot-marking device can do.

14 But if you could, just give us a high level overview of  
15 the BMDs.

16 **A.** Yes. So it provides a touch screen interface to the voter  
17 as well as an audio tactile interface for voters with  
18 disabilities. It provides both visual and in the case of a  
19 disabled voter audio instructions to navigate through the  
20 ballot and allow the voter to make selections for choices on  
21 the ballot.

22 And then it provides consolidated review of all of those  
23 choices and then an option to print the QR coded summary  
24 ballot. It also provides -- you know, once you look at that  
25 review, you can go back and modify your choices at any time.

1 And then at the end of the day, you get out a printed  
2 ballot record that the voter then takes into and feeds into the  
3 ImageCast precinct tabulator.

4 **Q.** All right. And we discussed -- opposing counsel discussed  
5 undervotes earlier.

6 Can you tell us does the BMD identify undervotes to the  
7 voter before printing of the ballot?

8 **A.** Yes, it does. So -- so a couple of things there. So a  
9 lot of feedback is given to the voter on both the wall voting  
10 within the ballot selections and on the review screen. So  
11 obviously since it is a touch screen interface that we have  
12 full control over, we actually don't allow the voter to make  
13 overvote selections. Anything that is undervoted is clearly  
14 indicated to the voter before printing the ballot. So it  
15 really addresses a lot of the voter intent issues that you have  
16 with hand-marked ballots.

17 **Q.** Okay. And I apologize. But if my screen is breaking up,  
18 please let me know because I had a message saying my connection  
19 was slow.

20 **A.** You are a little blurry.

21 **Q.** Okay. Can you hear me just fine?

22 **A.** Yes.

23 MR. RUSSO: And, Judge Totenberg, can you hear me?

24 THE COURT: Perfectly.

25 MR. RUSSO: Okay. Then I'll just continue forward.

1 You don't necessarily need to see my face.

2 **Q. (BY MR. RUSSO)** Now -- the printout of the ballot, does  
3 that indicate whether the voter has -- well, in the instance of  
4 an undervote, does the printout provide any indication of that?

5 **A.** Yes, it does. So very similar to the review screen, the  
6 printed ballot -- it lists all of the contests and the choices  
7 made. And if there was not a selection made, whether it is for  
8 a single vote or a multi vote, it clearly communicates that  
9 information to the voter on the printed record.

10 **Q.** Okay. And we've discussed --

11 THE COURT: I'm sorry. Does it say blank, or what  
12 does it say?

13 THE WITNESS: I believe it says no selection made.

14 THE COURT: Go ahead.

15 MR. RUSSO: Yes, ma'am.

16 **Q. (BY MR. RUSSO)** And in your experience, Dr. Coomer, do  
17 BMDs have the type of voter intent issues that hand-marked  
18 paper ballots do?

19 **A.** No, they don't. As I mentioned, the system itself  
20 prevents things like overvotes, which is a very common voter  
21 intent issue. The selections are determinative. There is no  
22 counting of pixel density within the target range. The  
23 selections are explicit.

24 **Q.** Has Dominion received any complaints about the BMDs such  
25 as those that are deployed in Georgia selecting the wrong



1 candidates when voters touch the screen?

2 **A.** No. And if I can expand on that, I mean, that was a  
3 common complaint of legacy touch screen systems. Those legacy  
4 systems used a different touch screen technology that was very  
5 susceptible to calibration issues. We do not experience those  
6 on the modern equipment. So that has not been an issue in the  
7 field.

8 **Q.** And can you expand on that for us about the -- how does  
9 the BMD -- Dominion's BMD touch screen work compared to the  
10 calibration-type touch screens in the legacy systems?

11 **A.** Yes. So the monitoring touch screens are what is called a  
12 capacitive touch screen. It is the same technology that is on  
13 your smart phones. Legacy systems were resistant touch  
14 screens. They were very susceptible to environmental  
15 conditions, use, and experienced what is called drift in the  
16 calibration of the screens.

17 **Q.** How many jurisdictions that you know use the Dominion  
18 BMDs?

19 **A.** Yeah. Again, I don't have any exact numbers. I think  
20 currently we are in -- with the ICX BMD, we are in somewhere  
21 between five and seven states. And, you know, if you are  
22 counting jurisdictions that is county-based -- I mean,  
23 obviously in Georgia we're in 159 counties. In Colorado, I  
24 believe we are in 62 of the 64 counties with the ICX BMD.  
25 We're in, I think it is, 40 or 42 counties in California,

1 Michigan, Ohio, Tennessee, New Jersey, Pennsylvania.

2 THE COURT: I'm sorry. When you are listing these  
3 states, are you saying statewide or you have some jurisdictions  
4 you are servicing?

5 THE WITNESS: No. Some jurisdictions. Statewide --  
6 statewide -- again, I think statewide -- specifically  
7 statewide, Georgia only. But, again, like in Colorado it is 62  
8 of the 64 counties. California, it is 40 to 42 of 60-plus  
9 counties. So it runs -- it runs a range.

10 **Q. (BY MR. RUSSO)** And earlier there were some questions  
11 about the QR code on the printed ballot. Can you explain for  
12 us the various features of the QR code?

13 **A.** Yeah. So as discussed in some prior testimony, we encode  
14 quite a bit of information on the QR code. There are some  
15 election specific data that is encoded on there. There is  
16 essentially what is referred to as a bitmask of all of the  
17 choices available on the ballot and those that are,  
18 quote-unquote, marked through the BMD system.

19 And then there is a hash -- SHA-256 hash of that record  
20 also encoded in the barcode that is used to verify both the  
21 source and integrity of the data. And that is in the barcode.

22 And then on the ballot itself, as we discussed, there is  
23 the human readable summary of all of the selections made and an  
24 indication of any selection that was not made, quote-unquote,  
25 an undervote.

1 Q. Mr. Liu discussed or mentioned that encryption is an  
2 industry term of art. Is the QR code encrypted based on the  
3 industry term -- that industry term of art?

4 A. No. We do not encrypt the barcode. We do digitally sign  
5 the bar -- the data that is in the barcode. And then the  
6 barcode itself is in a binary format.

7 Q. Is the QR code intended to be encrypted?

8 A. No, it is not.

9 Q. How would the -- either one of the scanners, the ICC or  
10 the ICP scanner, know that a QR code has not been tampered  
11 with?

12 A. We do a verification of the digital signature of the  
13 record. And that is using the secure keys that are part of the  
14 system and the standard SHA-256 hashing algorithm.

15 Q. And what are -- can you explain what the SHA-256 checksum  
16 is?

17 A. I can give you a summary of that. I mean, it is  
18 essentially an algorithm that is applied using a cryptographic  
19 key that gives a unique signature of the data within the  
20 record.

21 Q. And is that what the digital signatures verify?

22 A. Yes, it is.

23 Q. What would be needed for someone to access all of the  
24 software coding and encryption key material to generate a valid  
25 QR code that would be accepted by an ICP scanner?

1     **A.**     Well, I mean, that is kind of an open-ended question. But  
2     essentially they would have to breach all levels of the system.  
3     They would have to get access to the source code to understand  
4     how data is exchanged. They would have to defeat all of the  
5     various, you know, physical security mechanisms.

6             And then they would have to essentially reverse engineer  
7     the entire system to, you know, build and exploit a valid  
8     threat factor in order to compromise the system.

9     **Q.**     I'll turn to the ICP scanners and tabulation of  
10    hand-marked paper ballots.

11            What does the ICP read when a hand-marked paper ballot is  
12    placed into the scanner?

13    **A.**     Regardless of whether it is hand-marked or the QR ballot,  
14    the scanners first take a digital image of both sides of the  
15    ballot. In the case of hand-marked paper ballots, it looks for  
16    various artifacts that are included on the printed ballot.  
17    These are referred to as things like long corner marks and the  
18    timing marks. You can see those in any of the ballot  
19    representations that have been presented.

20            That is used to essentially orient the image so that then  
21    we can apply our image processing algorithms. We use those  
22    corner marks to orient the image. We use the timing marks,  
23    essentially set up a grid to define where the specified voting  
24    target locations are. And then our image recognition analyzes  
25    those target areas and looks for -- essentially calculates the

1 percentage fill of those areas to determine whether it is a  
2 mark or not -- a selected choice or not.

3 **Q.** In Georgia, the hand-marked paper ballots have a black  
4 oval. Does that contribute to the calculation of the ballot  
5 fill?

6 **A.** It absolutely does. So -- and, again, I don't want to  
7 make any definitive statements on whether one is better than  
8 the other as far as, you know, target color.

9 But one -- one of the issues to consider when having a  
10 black target in the scanning system is that by definition the  
11 scanner can -- will pick up that target and it does contribute  
12 to some of the, quote-unquote, signal of the pixel fill of the  
13 target area.

14 **Q.** So if the scanner setting -- scanner threshold settings  
15 were set too low or turned off entirely, how would that impact  
16 the ballot targets in the scanning process?

17 **A.** Yes. So let me be a little more specific. So a target --  
18 a black target in any scanning system is going to register some  
19 percent of fill of the target area. That is dependent not just  
20 on the color of the target but on the thickness of the target  
21 and that is dependent on the print quality. That is one of  
22 those things going back to -- you know, we discussed some of  
23 the things about qualified printers, et cetera. Those are a  
24 lot of the things that we analyze. Because, you know, when we  
25 go through a printer, we want to try to ensure that targets

1 are, you know, well defined but also as thin as possible.

2 And in a well represented ballot, that target area of the  
3 black target will contribute anywhere from three to  
4 seven percent target fill. So if you would set a lower  
5 threshold -- let's say you set it to five percent -- every  
6 target on the ballot would register as an ambiguous mark or  
7 potentially as an ambiguous mark because just the presence of  
8 that black oval could be above five percent.

9 So that is one of the -- that is one of the variables that  
10 we have to consider when we define these threshold values.

11 **Q.** You mentioned Colorado earlier as one of the jurisdictions  
12 or states that has a number of Dominion ballot-marking devices  
13 and scanner systems in place.

14 Were you at Dominion when Colorado switched to that setup?

15 **A.** Yeah. I actually -- I was part of the design team for the  
16 ICX BMD, which was actually developed in partnership with  
17 Denver County in Colorado. So yes, I was there from the first  
18 meeting until the final implementation.

19 **Q.** And are you familiar with the -- whether Colorado on  
20 hand-marked paper ballots has a black oval or a red oval?

21 **A.** The majority of counties in Colorado use a red oval. And  
22 they do configure the scanners to use what is called a red  
23 dropout.

24 So in that configuration, the scanner cannot even see a  
25 red color. So it does not -- the presence of a red target does

1 not add any percentage fill to the target area. So, again,  
2 that is one technique for increasing the sensitivity of the  
3 entire system when scanning ballots.

4 **Q.** So if a -- so if I understand, if Colorado is at a  
5 five percent target fill with a red oval and Georgia is at a  
6 ten percent target fill with a black oval -- you said that  
7 black oval is three to seven percent -- Georgia's target fill  
8 is actually less, I would say?

9 **A.** Yeah. I mean, it is about -- so, again, it is about  
10 equivalent of the sensitivity. It is a little more nuance than  
11 that.

12 But, again, if you are using black ovals, you have to  
13 raise the lower threshold to compensate for the -- for the  
14 effect of having a black oval that leads to, you know,  
15 registering pixel fill in a target area.

16 **Q.** When the scanners -- when Dominion's scanners were  
17 certified, do you know if they were certified to any particular  
18 threshold settings for the ICP?

19 **A.** Yeah. So we have default settings as part of the system.  
20 Those are based on our, you know, decades now of empirical  
21 field evidence and image analysis of the system.

22 So when we go into certification, we use those default  
23 values. That is how the system is delivered. But, again,  
24 early enough in a specific project, end users, states, they can  
25 modify those thresholds, again with all the caveats of, you

1 know, target color and whether you are using red dropout or  
2 not.

3 **Q.** Georgia could not just switch over to a red dropout is  
4 what you are saying?

5 **A.** Oh, no. They could configure the system to use a red  
6 dropout and red ovals. That is all part of the configuration  
7 of the system.

8 I'm just saying that when you make those configuration  
9 changes we use different default values of the thresholds to  
10 compensate for those different configurations.

11 **Q.** And presumably you would need different types of ballots  
12 printed?

13 **A.** Correct.

14 **Q.** Now, we heard about the AuditMark earlier. What  
15 information is included in the AuditMark from the ICC?

16 **A.** So from the ICC, we included a couple of pieces of what  
17 I'll call metadata. You know, we have a date stamp on the ICC  
18 because there's not the issue of voter privacy in the central  
19 count situation. You know, we have information about what  
20 scanner it came from. All the scanners get a serial number  
21 essentially in the system.

22 We have precinct information, ballot style information.  
23 And then the bulk of the AuditMark -- the meaningful  
24 information on the AuditMark is a contest-by-contest listing of  
25 all of the choices that register as a valid vote.



1 And then --

2 **Q.** Go ahead. I'm sorry.

3 **A.** And then just because I know the question is coming,  
4 anything that is not registered as a vote would be marked as an  
5 undervote for a particular contest or a blank vote.

6 **Q.** Does the AuditMark include information about ambiguous  
7 marks from the ICC?

8 **A.** The AuditMark does not, no.

9 **Q.** What does happen when an ambiguous mark is determined?

10 **A.** So, you know, the AuditMark and the images of the ballot  
11 is just one piece of digital information that we capture when  
12 scanning a ballot. So, you know, once the AuditMark and the  
13 images are captured and the image is analyzed, we create what  
14 is called a cast vote record.

15 And, again, that has a lot of election specific data. It  
16 has some correlation to the image that is saved. And then it  
17 has additional metadata around things like ambiguous marks. It  
18 includes things like what the actual percentage fill of each  
19 mark that is detected. All of that is included in that cast  
20 vote record.

21 So, you know, an image is correlated to a cast vote  
22 record. We use all of that information, you know, when doing  
23 something like sending a ballot to adjudication.

24 **Q.** Would the cast vote record be reflected on the AuditMark?

25 **A.** No, it is not part of the AuditMark. But it is correlated

1 to the image that includes the AuditMark.

2 **Q.** Can you explain what is the importance then of the cast  
3 vote record?

4 **A.** So the cast vote record is actually the digital data that  
5 is used for generating the reports. Right? So, you know, we  
6 capture the image as part of the auditability and transparency  
7 of the system.

8 The AuditMark is, again, a contemporaneous record of how  
9 the tabulator interpreted, you know, ballot marks at the time  
10 of scanning. And the cast vote record is the actual bytes that  
11 are used to tabulate ballots and report on ballots in the  
12 system and also to support things like our digital adjudication  
13 along with the image.

14 THE COURT: I'm sorry. You need to go over that  
15 again. You got the AuditMark versus the cast vote record.

16 Which one were you just describing?

17 THE WITNESS: Well, I was describing both. So the  
18 image of the ballot, we append the AuditMark. It is part of  
19 the image that is taken by the scanner. The cast vote record  
20 is the actual digital record of the vote data that corresponds  
21 to that image and AuditMark.

22 THE COURT: So which one has the -- we were talking  
23 about ambiguous. Is that -- we know that is not appearing on  
24 the AuditMark.

25 THE WITNESS: All of that data is included in the

1 cast vote record.

2 THE COURT: Does the image also reflect when there is  
3 no selection at least as recorded by your system?

4 THE WITNESS: Yes, it does. The AuditMark does, yes.

5 THE COURT: The AuditMark does?

6 THE WITNESS: Yes.

7 THE COURT: So the AuditMark says what has been  
8 passed, but it doesn't say -- but it doesn't identify by itself  
9 ambiguity that you have got ten -- let's say you have got ten  
10 checks for office which were ambiguous.

11 THE WITNESS: That's correct.

12 (Unintelligible cross-talk)

13 Q. (BY MR. RUSSO) Dr. Coomer, just for clarification, does  
14 the AuditMark include the metadata?

15 A. It includes some metadata. Like I said, it includes  
16 things like what, you know, physical ICC it was scanned on,  
17 what batch it is part of, the sequence number within the batch.  
18 So there is some metadata, but it does not include the metadata  
19 allowing ambiguous marks and things like that.

20 Q. Yesterday plaintiffs showed some ballot images containing  
21 missing ovals on the ballot.

22 Did you see those?

23 A. Missing ovals? I think I did. I think I recall seeing  
24 something like that. And, again, I mean, when you say missing  
25 ovals, you mean on the image you could not see the artifact of

1 an oval?

2 **Q.** That's correct.

3 **A.** Okay.

4 **Q.** Do you know why a ballot would -- a ballot image would  
5 show -- would have all the ovals missing?

6 **A.** Yeah. That is -- that happens when you have a red oval  
7 and you are using red dropout on the scanner.

8 THE COURT: But I thought you only used black in  
9 Georgia.

10 THE WITNESS: As far as I know, we only use black. I  
11 can't say that, you know, with a 100 percent. I know that  
12 predominantly black ovals are used in Georgia.

13 But, again, if we're talking about a scanned image, I  
14 know that one was showed that didn't have ovals. The only way  
15 that I'm aware of that that could happen is because the ovals  
16 were printed in red and red dropout was used.

17 So I can't say what the origin of that image was.  
18 And it may not necessarily be from an official Georgia project.

19 **Q. (BY MR. RUSSO)** If the image was viewed outside of  
20 Dominion's hardware, would that cause -- possibly cause any  
21 changes or if it was a PDF?

22 **A.** I mean, if the image was manipulated, it would. But, you  
23 know, we capture these images in a standard TIFF format kind of  
24 like a JPEG. It is just a different coding algorithm. There  
25 is nothing in the system that would go in after scanning and,

1 quote-unquote, remove image data.

2 If there is not an oval target, it is either because it  
3 was a red dropout red oval ballot that was scanned or the image  
4 was manipulated after scan time.

5 **Q.** And counsel for the plaintiffs asked you about  
6 different -- about availability of paper ballots -- hand-marked  
7 paper ballots and mentioned photocopying of a valid ballot.

8 And you stated in response that you could not agree that a  
9 scanner would count a photocopy of a paper -- hand-marked paper  
10 ballot.

11 What did you mean there? Why would you say that?

12 **A.** Well, I said that potentially it could -- it could count.  
13 But there is no guarantee that it would -- would count the same  
14 as an officially printed ballot from a qualified printer.

15 **MR. RUSSO:** And I don't think I have any more  
16 questions at this time, Your Honor.

17 **THE COURT:** All right. Are there any other -- any  
18 cross-examination follow-ups?

19 **MR. RUSSO:** Mr. McGuire appears to be holding his  
20 hand up.

21 **THE COURT:** All right, Mr. McGuire. Thank you.

22 **COURT REPORTER:** He is muted.

23 **THE WITNESS:** I think you can unmute yourself once --

24 **THE COURT:** I don't think he can.

25 **MR. MCGUIRE:** I have been invited to unmute, and I

1 have.

2 (There was a brief pause in the proceedings.)

3 RECROSS-EXAMINATION

4 BY MR. MCGUIRE:

5 Q. Okay. Dr. Coomer, just a couple of points on, I guess,  
6 redirect, recross.

7 First of all, you mentioned that the BMDs are used in a  
8 number of other jurisdictions; right?

9 A. Correct.

10 Q. Now, 62 of the 64 counties in Colorado that used BMDs only  
11 used them for accessibility purposes; isn't that right?

12 A. No, that's not correct at all.

13 Q. How many of them use it for all voters?

14 A. It depends. And I am a Colorado resident. So I actually  
15 know the statute.

16 They use the ICX BMDs in the voting service polling  
17 centers, the SPCs. Any voter that comes to the SPC can request  
18 to vote on the ICX BMD or they can request to get a hand-marked  
19 paper ballot. It is up to the voter. And it is not restricted  
20 to disabled voters.

21 And I vote on the ICX BMD in Colorado, and I'm not  
22 considered somebody with a disability.

23 Q. So you are saying it is available to all voters, but it is  
24 not the required -- it is not the default voting mechanism for  
25 all voters?

1     **A.**    Many -- many of the SPCs, many of the counties do try  
2     to -- I want to be careful on how I qualify this. They do make  
3     that the predominant voting channel for people that vote in  
4     person, yes.

5     **Q.**    Okay. How many of the jurisdictions that you listed as  
6     using BMDs actually use them for all voters?

7     **A.**    I don't think anybody uses them for all voters because you  
8     always have absentee and mail-in voters for some voting  
9     population.

10    **Q.**    Right. Let's say for all in-person voters.

11    **A.**    Again, I couldn't give you a definitive answer on that. I  
12    know that, again, some it is a predominance and some it is not.

13    **Q.**    And did I understand you correctly to testify that the BMD  
14    QR code is encrypted or is not encrypted?

15    **A.**    It is not.

16    **Q.**    It is not encrypted.

17           Okay. Are you aware that Mr. Cobb from Pro V&V has  
18    submitted a declaration in this case which quotes Dominion  
19    documentation saying that QR codes -- encoded data is encrypted  
20    and signed in order to prevent tampering of user selection and  
21    eliminate the possibility of error?

22    **A.**    I have not read Mr. Cobb's declaration. I have seen a  
23    couple of exhibits put up today. And I am also aware that he  
24    amended his declaration to amend that statement.

25           I'm not sure where the miscommunication came from. But as

1 far as I know, he has amended that declaration and he is no  
2 longer stating that Dominion documentation states that it is  
3 encrypted. We wouldn't state that in documentation because it  
4 is not encrypted, never has been, never planned for.

5 **Q.** Okay. So it is your testimony that the quotation from  
6 Dominion documentation to that effect is -- was wrong?

7 MR. RUSSO: Your Honor, I was trying to impose an  
8 objection on the line of questioning regarding the Pro V&V  
9 analysis that Mr. McGuire is discussing because it is outside  
10 the scope of direct.

11 THE COURT: Well, they are talking about encryption.  
12 I think he is just trying to verify that it has never -- the  
13 word encryption -- the representation of encryption has not  
14 been in the Dominion documentation.

15 Is that your representation?

16 THE WITNESS: As far as I know. I haven't -- I  
17 haven't seen any documentation from us that states the barcode  
18 is encrypted.

19 **Q. (BY MR. McGUIRE)** You testified that the cast vote record  
20 is correlated to the edges in the scanners.

21 **A.** Yes.

22 **Q.** How are they correlated? What is the correlating -- what  
23 is correlating them?

24 **A.** There is a cast vote record ID that is included. It is  
25 actually the -- it is the name of the image file. It is the



1 cast vote record ID of the cast vote record that is stored in  
2 the system.

3 THE COURT: I'm sorry. Ms. Welch, what did you want?

4 COURT REPORTER: I got it.

5 THE COURT: The cast vote record is --

6 THE WITNESS: There is a cast vote record ID that is  
7 assigned to the cast vote record. And that is the image name.  
8 And it is included -- it is not just the name of the image  
9 file. But it is also included in the image itself as part of  
10 the AuditMark.

11 **Q. (BY MR. McGUIRE)** And so -- it is your testimony that the  
12 image in the AuditMark includes some metadata but not all of  
13 the metadata that is in the cast vote record?

14 **A.** Correct.

15 **Q.** Okay. And nothing in the cast vote record contains any  
16 kind of date or time of creation of the file?

17 **A.** I didn't say that. So it depends on -- it depends on the  
18 source of the image. So for a centrally counted ballot, we do  
19 include date/time stamp information because there is not the  
20 concern of voter privacy. And that helps with things like  
21 auditing and correlation.

22 THE COURT: I'm sorry. For which type of ballot?

23 THE WITNESS: That is for the centrally counted  
24 ballot.

25 THE COURT: All right.

1     **A.**     So the ICC. So the AuditMark between the ICC and the ICP  
2     are different.

3     **Q.**     **(BY MR. McGUIRE)** The cast vote record, it sounds like,  
4     they are different as well?

5     **A.**     Correct.

6     **Q.**     Dr. Coomer, you testified in response to Mr. Russo that  
7     the Dominion system actually was -- there actually was a  
8     certification change, that the 5.5-A Georgia system actually  
9     was different from the 5.5-A?

10    **A.**     No.

11    **Q.**     Is that correct?

12    **A.**     No. I have had to repeat that multiple times. There is  
13    absolutely no difference between the 5.5-A and what is labeled  
14    as 5.5-A (GA). There is a difference between the 5.5 and the  
15    5.5-A.

16    **Q.**     Okay. So I would like to show an exhibit, PX 54. Now,  
17    this is the -- I'm going to represent to you this is the Pro  
18    V&V report. And --

19             MR. RUSSO: Again, Your Honor, I would object to this  
20    being outside the scope of direct as I did not ask him about  
21    the Pro V&V report.

22             MR. McGUIRE: Your Honor, my position is that this  
23    would be rebuttal of the testimony he gave when Mr. Russo  
24    questioned him.

25             THE COURT: All right. I'll let you go for a little

1 while. And if it is not directly responsive --

2 MR. McGUIRE: It will be quite short.

3 And I know Ms. Cole is doing this and not the tech  
4 people, so I'll ask Ms. Cole if you can turn that document to  
5 Page 3 of the PDF.

6 **Q. (BY MR. McGUIRE)** And it is -- I'm going to direct your  
7 attention, Mr. -- Dr. Coomer, to the bottom of Page 3 where --  
8 it might be small there. I'm going to read to you -- there is  
9 a Section 1.3 called description of modification.

10 And the last two sentences read, Dominion's ECO, which I  
11 believe is engineering change order, and there is a number --  
12 introduces the DR G2140 scanner to support the D Suite 5.5-A  
13 (GA) system configuration.

14 Do you see that? Did I read it correctly?

15 **A.** Yes.

16 **Q.** And it says, due to the previously approved Canon DR G1130  
17 going end of life, the Canon DR G2140 scanner is the  
18 manufacturer's recommended replacement.

19 Did I read that right?

20 **A.** Yes, you did.

21 **Q.** Okay. Then in the next Section 1.4, it refers to the  
22 scope of testing required for the submitted modification.

23 Do you see that?

24 **A.** I mean, I see a 1.4. I could probably read everything  
25 that is in there.

1 I will cut to the chase. I know where you are going with  
2 this. So --

3 **Q.** Well, maybe you do. I mean, I'm going -- I'm going to go  
4 back to Page -- go to the next page, Page 4. And I'll direct  
5 you to Section 2.0, testing overview.

6 It says there, the first sentence, the evaluation of D  
7 Suite 5.5-A (GA) was designed to verify that certain features  
8 and applications which have been modified from the certified  
9 baseline system conform to the applicable EAC VVSG 1  
10 requirements.

11 **A.** Yeah.

12 **Q.** How is that consistent with your testimony that there is  
13 no change to the system from 5.5-A?

14 **A.** Because we applied this same ECO to the baseline 5.5-A EAC  
15 certification. So if you go to the current EAC website and go  
16 under and pull up our 5.5-A certification, you will see the ECO  
17 with a 2140 DRG Canon scanner.

18 **Q.** And that is pulled up under 5.5-A, not under 5.5-A (GA)?

19 **A.** That's correct.

20 **Q.** So this is not a change you made specifically for Georgia?  
21 It is for all of your 5.5-A systems?

22 **A.** That's correct. And, again, that is an ECO for hardware.  
23 And I have been very explicit that there were no firmware or  
24 software differences between those.

25 MR. RUSSO: Again, Your Honor, I just want to renew

1 my objection to this report coming in under Dr. Coomer. It is  
2 outside the scope of his direct. And Mr. McGuire is obviously  
3 trying to contest the accuracy of that report through  
4 Dr. Coomer. And, of course, we'll have Mr. Cobb up from Pro  
5 V&V later.

6 THE COURT: Well, I disagree because he strongly  
7 represented that there had been no changes. And so I think he  
8 is entitled to explore that and see whether it was true or not  
9 true.

10 MR. RUSSO: Right. And that is fine.

11 THE COURT: All right. Anyway, your objection is  
12 overruled.

13 All right. Let's proceed.

14 **Q. (BY MR. McGUIRE)** Mr. Coomer, in your declaration from  
15 November --

16 **A.** I'm sorry. It is doctor.

17 **Q.** I apologize. I apologize. It is a habit.

18 **A.** You never make that mistake with your witnesses.

19 **Q.** Yes. I apologize. It is not intentional.

20 Dr. Coomer, in your declaration, 821-1 in November of  
21 2019, you wrote that any changes to the source code of any  
22 components of Democracy Suite would require new certification  
23 by the U.S. Election Assistance Commission and the State of  
24 Georgia.

25 Do you still -- do you stand by that statement?

1     **A.**     That has changed slightly because at the time that that  
2     declaration was made I don't believe that there was complete  
3     guidance from the ECO on de minimis software changes. That has  
4     been clarified, and it might have actually been sort of  
5     contemporaneous to that.

6             So there is a mechanism at the EAC currently to support de  
7     minimis software changes that do not trigger a full  
8     recertification effort.

9     **Q.**     And changing a printer is a de minimis change?

10    **A.**     Yes, it is. Well, in our case, it was deemed de minimis.  
11    I could certainly envision a printer change that required, you  
12    know, new drivers, new software that would not be de minimis.

13    **Q.**     And when you told Mr. Russo that the change to the Georgia  
14    version was the BMD touch screen, how does that fit into this  
15    change to the printer?

16    **A.**     As I explained, the change to the ICX software was between  
17    5.5 and 5.5-A.

18    **Q.**     And I apologize. I want to correct myself. I said how  
19    does it compare to this change to the printer. I meant this  
20    change to the scanner. I apologize.

21    **A.**     It is completely different. The change between 5.5 and  
22    5.5-A on the ICX was actually source code change that was not  
23    deemed de minimis.

24    **Q.**     And that -- was that the BMD change that went from 5.5 to  
25    5.5-A?

1     **A.**     That's correct.

2     **Q.**     So has there been any other changes apart from this  
3     scanner change between 5.5-A and 5.5-A (GA)?

4     **A.**     No.

5     **Q.**     Okay. And I believe you mentioned a VVSG 1.1 standard to  
6     Mr. Russo. Just to be clear, the 5.5-A (GA) system is  
7     certified with a VVSG 1 standard; correct?

8     **A.**     I mean -- well, I would have to look at the report.  
9     Because, again, just different testing campaigns are either  
10    under 1.0 or 1.1. So I can't say.

11    **Q.**     Would you disagree with Pro V&V if they said in their  
12    report that it was certified with a 1.0 standard?

13    **A.**     No, I wouldn't disagree.

14    **Q.**     And you agree that the VVSG 1.0 standard is about ten  
15    years older than the VVSG 1.1 standard?

16    **A.**     Yes. But I can also say that just because it was tested  
17    to 1.0 does not mean that it doesn't use the 1.1 standards.

18            MR. MCGUIRE: Okay. Your Honor, I have no further  
19    questions.

20            MR. CROSS: Your Honor, this is David Cross. Two  
21    quick questions if I may just picking up on Mr. Russo's.

22            THE COURT: All right.

23                           CROSS-EXAMINATION

24    BY MR. CROSS:

25    **Q.**     I just want to make sure I understand your position,

1 Dr. Coomer.

2 Did I understand correctly that you have never seen any  
3 representation by Dominion that the QR codes are encrypted?

4 **A.** I haven't seen any representation, no.

5 MR. CROSS: Ms. Cole, can you just quickly pull up  
6 the document I just sent you? Just the cover page. Only the  
7 cover page. It is PX 56.

8 **Q. (BY MR. CROSS)** And while she does that, Dr. Coomer, I can  
9 just ask you if it helps.

10 Have you ever seen a document entitled from Dominion 2.02  
11 Democracy Suite system overview? Does that sound familiar?

12 **A.** I mean, it sounds familiar. But that is our standard  
13 naming convention for documentation. I can't say whether I  
14 have actually read every page of that specific document.

15 LAW CLERK COLE: Mr. Cross, can you hear me?

16 MR. CROSS: Yes.

17 LAW CLERK COLE: There was no attachment to your last  
18 email that says PX 56.

19 MR. CROSS: Sorry. Yes. Sorry. It is the one that  
20 I emailed you that you responded to. It is the same document.

21 LAW CLERK COLE: Okay.

22 MR. CROSS: I'm sorry. It has got like a bright red  
23 cover page.

24 **Q. (BY MR. CROSS)** Again, Dr. Coomer, while she's pulling  
25 that up, did you review Mr. Cobb's declarations?



1     **A.**    No, I did not.

2     **Q.**    So have you seen this document before from Dominion that  
3       was produced to us by the State?

4     **A.**    Again, I can say that I have seen many documents that look  
5       a lot like this. I can't say definitively if I have seen this  
6       exact same document. And I certainly say I have probably not  
7       read every page in it.

8     **Q.**    Well --

9               MR. RUSSO: Just real quick, Your Honor -- sorry,  
10       David -- I noted that it has got attorneys' eyes only on the  
11       bottom. Is this one of the documents we had resolved  
12       previously, or is this still deemed attorneys' eyes only?

13              MR. CROSS: I'm not sure. But I'm not going to put  
14       the substance up. I literally just have one more question on  
15       this.

16              MR. RUSSO: Okay.

17     **Q.    (BY MR. CROSS)** Dr. Coomer, my understanding is that this  
18       is the document that Mr. Cobb cites and quotes publicly in his  
19       declaration where he says he relied on Dominion to represent  
20       that the QR codes were encrypted.

21              And what it states -- what he quotes from this document  
22       states, encoded data is encrypted and signed in order to  
23       prevent tampering of user selection and eliminate possibility  
24       of error during ballot scanning process.

25              So just to confirm, that is a surprise to you that

1 Dominion made that representation to the public, to the State  
2 of Georgia?

3 MR. RUSSO: Object, Your Honor. One second. Because  
4 we didn't discuss Dr. Coomer -- excuse me -- Mr. Cobb's  
5 declaration on the direct or his report.

6 MR. CROSS: It goes to the security of the system,  
7 Your Honor. And it is literally one question.

8 THE COURT: Go ahead. But this is --

9 **(Unintelligible cross-talk)**

10 MR. CROSS: That's right.

11 **A.** Am I surprised that that statement is in a particular  
12 document that we delivered? Yes. Would I say that that is a  
13 smoking gun that we misrepresented the system? No. Is there  
14 an errata due from our documentation department -- because when  
15 you read that whole statement, it is pretty specific that it is  
16 in order to protect the integrity of the record. And that is  
17 what digital signing is.

18 So did somebody inadvertently add the encryption part, I  
19 mean, it appears so. Again, I haven't seen that specific  
20 document. I didn't read Mr. Cobb's declaration. But as you  
21 have represented it, if that is in there, then it needs an  
22 errata to it. Yeah.

23 MR. CROSS: Thank you, Dr. Coomer.

24 MR. RUSSO: No follow-up.

25 THE COURT: I just have one question.

## EXAMINATION

BY THE COURT:

**Q.** We've been talking about the image quality and the scanning and the -- and I think you said -- I may have misunderstood -- that there is no point or that you could not adjust the -- or it wasn't relevant to be speaking about DBT {sic} resolution. And I wondered if you could clarify that.

Were you here yesterday when Dr. -- when Mr. Hursti was testifying?

**A.** Yes. I have been on -- I have been on the whole time.

**Q.** All right. So that is what I'm trying to understand. What was -- what --

**A.** So this is in regards to the DPI, dots per inch, of the resolution of the image. And I can categorically state that going from the current 200 DPI to some higher level of 300 DPI does not improve the accuracy of the system.

**Q.** Well, so your view is essentially that some of the issues that the plaintiff pointed out that they were concerned about, if you were present, in terms of the images and what was being captured and the inconsistencies in what was reported versus not will be addressed by changing -- the State's changing the standard for -- on the low side of the threshold going down to 10 from 12 percent fill?

**A.** Yeah. So I mean, just to put it simply, we have all seen the images. And the images clearly show the voter's mark. The

1 DPI setting would -- if there was a ballot that showed -- you  
2 know, that if you had a physical ballot and you had some mark  
3 on there and then you showed the image and that mark wasn't  
4 there, then we could talk about DPI.

5 But the fact is we're looking at the image. The mark is  
6 there, and the issue that is being raised is that mark just is  
7 not crossing that threshold, the pixel count, not the fact that  
8 the image is not, you know, sufficiently fine enough resolution  
9 to capture that.

10 Does that make sense?

11 **Q.** I guess. But I'm trying to understand why the last  
12 witness yesterday who worked in the Morgan County adjudication  
13 panel, you know, and then who was running these ballots and  
14 getting inconsistent results -- wholly inconsistent results for  
15 some, regardless of pixels, how is that --

16 **A.** It is not -- see, that is the thing. It is not regardless  
17 of pixels. So the scanners have what is called a CIS array.  
18 It is contact image sensor array. That is what is used to  
19 actually digitize the image of the ballot.

20 And those inherently, like all electronic systems, have  
21 some variability, plus or minus ten percent. So on one scan  
22 you could certainly have a target area that registers  
23 2.5 percent and you round that up to 13. And on the next scan  
24 it could be 11.9 percent. There is inherent variability in all  
25 electronic systems.

1           So, you know, there was a statement made by that witness  
2           that she would expect, quote-unquote, computers to always give  
3           you the exact same answer. And anybody that works in  
4           technology and electronics would argue against that, especially  
5           when dealing with something like a contact image sensor. And  
6           that is irrespective of the resolution setting that's on the  
7           system.

8           **Q.** Well, those were some fairly significant inconsistencies  
9           though. And is there anything that Dominion is recommending in  
10          order to address that?

11          Because this is -- this is somebody's vote that just --  
12          that was identical to somebody else's. The other just  
13          simply -- depending on the way it is scanned, the incidence of  
14          that being scanned, one vote is going to count and one vote is  
15          not or that one precinct has a better scanner than the other  
16          and everyone who gets their vote -- all their votes cast in one  
17          county and not in the other.

18          **A.** I have never made that representation that we just ignore  
19          people's votes, to be clear.

20          **Q.** I'm not saying you did. I'm just trying -- but that is  
21          the inconsistency in counting of votes and how it is done and  
22          these margins is of concern if it is just -- there is --

23          **A.** There are threshold margins. And clearly you can always  
24          come up with some edge case that can demonstrate issues through  
25          the variability. It is the primary reason that we provided the

1 digital adjudication system. And that is all about providing a  
2 robust mechanism for ensuring that the system can interrogate  
3 voter intent issues.

4 And it is certainly light years ahead of previous ballot  
5 duplication boards that were relying 100 percent on human  
6 interaction to identify ballots with issues.

7 THE COURT: All right. Thank you for your response.

8 THE WITNESS: Thank you.

9 THE COURT: May this witness be excused, Counsel?

10 MR. RUSSO: Your Honor, I just have one quick  
11 follow-up for Dr. Coomer.

12 REDIRECT EXAMINATION

13 BY MR. RUSSO:

14 **Q.** Dr. Coomer, do you only get to these thresholds on the  
15 scanner if the voter does not follow the instructions to bubble  
16 in?

17 **A.** Well, certainly. I mean, that is why we have clear  
18 instructions on the ballot to fully fill in the bubble. That  
19 is why we recommend, you know, felt tip pens like a Sharpie.

20 But even with all of those recommendations, obviously  
21 voters do what voters do. And that will always be a problem  
22 with hand-marked paper ballots. Because even in a precinct  
23 where you can hand a voter a Sharpie pen, the voter will go  
24 to -- and I have seen this -- the voter will go to the voting  
25 booth and pull out their trusty favorite pen that is not a

1 Sharpie and then they will make a faint checkmark in the oval  
2 and they won't follow directions.

3 That is -- again, that is why we have -- and we have put a  
4 lot of time and effort into our adjudication system to try to  
5 close that gap as much as humanly possible to make sure that  
6 the voter's intent is applied to all votes.

7 MR. RUSSO: Thank you.

8 THE WITNESS: Thank you.

9 REEXAMINATION

10 BY THE COURT:

11 **Q.** I'm sorry. Who builds the ballots for the project? I did  
12 have that question as well.

13 **A.** So I believe -- and I think this is in my initial  
14 declaration -- a Dominion employee working in the  
15 state's location on-site using the state's certified installed  
16 equipment built the ballots for the initial primary.

17 And I think we did the same for the runoffs, but we may  
18 have had multiple employees in the State's location building  
19 the ballots. And then, again, the State and the counties are  
20 in charge of verifying that data and running the pre-logic and  
21 accuracy to make sure that that data is correct.

22 **Q.** And that is the plan also for the general election?

23 **A.** Yeah. Again, that work is already underway. And it is --  
24 again, it is all done on-site. Nothing is done off-site. It  
25 is all done within the State's location.

1 Q. And tell me -- in places like Colorado or California,  
2 which I know there are a number of BMDs in use, they use human  
3 review for some -- for sampling of the way that the hand count  
4 votes are to see whether that -- with the actual -- comparing  
5 it to the actual physical ballot to see whether it is capturing  
6 the ballot markings correctly.

7 A. So Colorado does have a statewide risk-limiting audit  
8 process that does compare physical ballots to the images and  
9 the cast vote records.

10 Is that what you are getting at?

11 Q. Yes, that is what I'm getting at.

12 A. Yeah. And there have been other pilots -- and I want  
13 to -- since you asked the question, I'll be clear.

14 Risk-limiting audits is just one statistical methodology  
15 of a ballot comparison audit. So a lot of times, RLA is used  
16 as a catchall phrase.

17 And that is -- an RLA is a very specific implementation.  
18 And not all things that are called RLAs are RLAs. And it  
19 really is a ballot comparison audit.

20 THE COURT: Thank you. All right. Dr. Coomer, I  
21 think that you are excused. But you are welcome to attend.

22 All right. Thank you.

23 All right. Who is the next witness?

24 MR. BROWN: Your Honor, the plaintiffs would call  
25 Rick Barron.



1 THE COURT: I'm going to need one minute before we  
2 start Mr. Barron. But go ahead. And then Ms. Cole will get  
3 him -- all of his permissions done. All right?

4 And have you sent the documents for Mr. Barron?

5 MR. BROWN: I have, Your Honor.

6 THE COURT: All right. And who is the next witness  
7 after that so that you all get that witness?

8 Hi, Ms. Ringer.

9 MR. BROWN: Who is -- I don't know who is after  
10 Mr. Barron.

11 MR. MCGUIRE: I think all the rest of our witnesses  
12 are postponed to the end because they are dealing with  
13 sensitive information.

14 MR. BROWN: Thank you. Thank you, Mr. McGuire.

15 THE COURT: Yes.

16 Ms. Ringer?

17 MS. RINGER: I'm muted. I'm sorry. The feedback --  
18 I'm sorry. I just wanted to remind everyone that Mr. Barron  
19 needs to be finished by 2:30. He has a flight to catch.

20 THE COURT: That's fine. Thank you though for  
21 reminding.

22 You wanted to -- shall we test your audio again,  
23 Ms. Ringer? Go ahead and speak.

24 MS. RINGER: Can you hear me, Your Honor?

25 THE COURT: Yes. It is -- there is a feedback.

1 But --

2 MS. RINGER: Can you mute this?

3 THE COURT: All right. We'll start in one minute.

4 And the State should consider whoever your next witness is.

5 MS. RINGER: Is this better?

6 THE COURT: That is better. Thank you.

7 Would the State -- the counsel handling the next  
8 witness for the State, would you please send those also on to  
9 Ms. Cole. And I'll be ready in one minute. Okay?

10 MS. RINGER: Yes.

11 **(A brief break was taken at 12:55 P.M.)**

12 THE COURT: All right. Are we ready to begin?

13 MR. BROWN: Yes, Your Honor.

14 THE COURT: Okay. Very good.

15 MR. BROWN: Should I call the witness, Your Honor?

16 THE COURT: Mr. Barron?

17 THE WITNESS: Yes.

18 THE COURT: We all look different sometimes by video.  
19 So having you closer in court, you look different than on the  
20 video. So I probably do too, and everything is wild.

21 So good to see you. Would you raise your right hand.

22 **(Witness sworn)**

23 THE COURT: Would you state what your location is.

24 THE WITNESS: I am in Atlanta at the county  
25 attorney's office.

1 THE COURT: All right. Very good. Thank you.

2 Whereupon,

3 RICHARD BARRON,

4 after having been first duly sworn, testified as follows:

5 CROSS-EXAMINATION

6 BY MR. BROWN:

7 Q. Mr. Barron, I am Bruce Brown. We have met.

8 What is your position?

9 A. The Director of Registration and Elections for Fulton  
10 County.

11 Q. And is Fulton County the biggest jurisdiction in the State  
12 of Georgia?

13 A. Yes.

14 Q. How many registered voters do you have approximately?

15 A. If you include inactive, it is about 845,000.

16 Q. And, Mr. Barron, the September special election is  
17 currently underway now; is that right?

18 A. Yes.

19 Q. And has Fulton County experienced problems with the  
20 electronic Poll Pads in the September election?

21 A. Yes. On Tuesday.

22 Q. And what problems did it have?

23 A. There were some precincts that if the voter -- once a  
24 voter checked in and went to get a card activated off the Poll  
25 Pad, if more than one voter from that -- after the first voter

1 checked in on that precinct, the Poll Pad would indicate that  
2 the voter had already voted and that another card couldn't be  
3 created.

4 **Q.** So you only got one checked in per Poll Pad; is that  
5 correct?

6 **A.** Yeah. In certain precincts.

7 We had -- we notified the vendor, KNOWiNK, on August 29  
8 that we were encountering an issue. It was the same issue we  
9 encountered in August. And they told us to do a hard reset,  
10 which we did.

11 The Poll Pads seemed to operate normally until about  
12 10:30 in those seven early voting sites. And then that issue  
13 reared its head again. And we confirmed that Clayton County  
14 and Dekalb County, the only other two counties in this  
15 election, had the same -- same issue.

16 **MR. BROWN:** Ms. Cole, if you could pull up for us  
17 Plaintiffs' Exhibit 53.

18 **Q. (BY MR. BROWN)** Mr. Barron, on the screen you should be  
19 able to see what has been marked as Plaintiffs' Exhibit 53.

20 Are you familiar with the guidance from the Secretary of  
21 State relating to using emergency paper ballots?

22 **A.** Yes.

23 **Q.** And pursuant to this guidance and regulations, Fulton  
24 County needs to be ready to use hand-marked paper ballots  
25 instead of BMDs under certain situations; correct?

1     **A.**    Yes.

2     **Q.**    And the guidance actually gives some detail on what you  
3    are supposed to do? For example, you need to have Sharpie,  
4    fine point black pens; correct?

5     **A.**    Yes.

6     **Q.**    And has other voting procedures that you need to follow  
7    for using hand-marked paper ballots instead of BMDs; correct?

8     **A.**    Yes.

9     **Q.**    And you and -- you have to stock hand-marked paper ballots  
10   to be used by hand in each of your voting locations already;  
11   correct?

12   **A.**    Yes. That's correct. We have to have ten percent of the  
13   number of registered voters assigned to that precinct worth of  
14   paper ballots.

15   **Q.**    And your poll workers know how to use hand-marked paper  
16   ballots so that they can comply with these emergency  
17   procedures; correct?

18   **A.**    Yes.

19   **Q.**    Mr. Barron, prior to -- I didn't go into your work  
20   background.

21           Prior to working for Fulton County, did you have  
22   experience in election administration in jurisdictions in which  
23   hand-marked paper ballots were the primary vote of elections?

24   **A.**    Yes. In early -- I think in 2000 to 2002 in Travis  
25   County, Texas, that was the case. And then when I was in

1 Williamson County, Texas, we did a hybrid system where at times  
2 we would do early voting via DRE and election day with paper.

3 **Q.** Mr. Barron, if the Court ordered Fulton County to use  
4 hand-marked paper ballots for election day, would you be able  
5 to comply? Would Fulton County be able to comply with the  
6 Court's order?

7 **A.** Yes. I mean, it is always -- I mean, the time -- the time  
8 frame now is a little tricky just because we have already  
9 prepared all of our training manuals for -- to go forward with  
10 BMDs.

11 **Q.** If you switched -- if you switched out the BMDs, however,  
12 it would save a lot of time, on the other hand, for a lot of  
13 activities that you have to do to set up the BMDs; correct?

14 **A.** Yeah. Well, you wouldn't have the same -- the same sort  
15 of time demands with regard to logic and accuracy. You  
16 still -- I mean, I think there would be tradeoffs. There  
17 probably would be overall less time spent preparing an election  
18 day with paper than currently just because of the logic and  
19 accuracy time.

20 MR. BROWN: Thank you. That is all I have, Your  
21 Honor.

22 THE COURT: Anything further from any other counsel?

23 MS. RINGER: I didn't know if the other plaintiffs'  
24 counsel wanted to question Mr. Barron.

25 MR. CROSS: Nothing from me, Your Honor.

1 MS. RINGER: Okay. I did have a couple of questions  
2 I wanted to ask Mr. Barron.

3 DIRECT EXAMINATION

4 BY MS. RINGER:

5 Q. With regards to Plaintiffs' 53, Mr. Barron, is it your  
6 understanding that this document is the SEB rule?

7 A. Yes.

8 Q. Okay. I want you to take a look at this document. The  
9 first paragraph cites an SEB rule. The second paragraph cites  
10 an SEB rule. But the paragraph that is circled and pointing to  
11 the pens doesn't cite an SEB rule.

12 So is there an SEB rule that tells you specifically what  
13 type of pen to utilize?

14 A. No, not of which I'm aware. I just -- I think this is a  
15 recommended -- these are recommended pens. And this looks like  
16 this is from a State -- State document. I think that Secure  
17 the Vote logo up at the top means that the State made that.

18 Q. Okay. So it is a recommendation, but it is not SEB rules?  
19 Would that be accurate?

20 A. I would -- I would agree with that.

21 Q. Mr. Barron, Mr. Brown asked you about being prepared to  
22 switch to paper. Do you have any concerns about the number of  
23 ballots that you would have to have at the precinct to do a  
24 paper election?

25 A. Ordering the paper?

1 Q. If that is how you want to put it, yes, sir.

2 A. I mean, the only challenge I think would be switching the  
3 whole -- the entire state, you know, finding a vendor that  
4 could do that quickly and accurately.

5 You know, we aren't versed in Georgia on ordering massive  
6 amounts of paper ballots. So I'm not sure how -- at this date  
7 how that would impact us.

8 Q. When does early voting start for the November election?

9 A. October 12th.

10 Q. Mr. Brown asked you specifically about election day. Do  
11 you have any concerns about using paper ballots for early  
12 voting or advance voting?

13 A. I am -- I mean, I would not want to use paper ballots for  
14 early voting. I just think it is easier to administer early  
15 voting with paper -- or with BMDs or electronic voting of some  
16 sort because you have all of those ballot styles that you have  
17 to put into each one of the polling locations.

18 Q. How many polling locations are you expecting to have for  
19 early voting?

20 A. Between permanent and outreach and our buses, we probably  
21 have up to 33 locations per day operating.

22 Q. How many --

23 A. They require -- it is required that all ballot styles be  
24 available in all of those locations.

25 Q. And so how many ballot styles would you have to have



1 physically on paper at these -- did you say? -- 33 locations?

2 **A.** Yeah. Well, we have 377 precincts. So we would have a  
3 minimum of 377 ballot styles.

4 **Q.** And so do you have a concern about the administrative  
5 problems and possible human error that could result if you had  
6 377 ballot styles that people had to physically make sure were  
7 presented to the correct voter at each of your 33 locations?  
8 Is that accurate to say?

9 **A.** Yes. We -- in my experience with paper and early voting  
10 in Texas, we had a lot of poll worker errors handing out  
11 incorrect paper ballots. It was just -- there were many --  
12 even when you have them in clearly marked folders or on  
13 shelves, it is easy for a poll worker to -- throughout a long  
14 day to grab the incorrect ballot and the voter not notice it.

15 **Q.** So is that part of the reason for saying that you would  
16 not want to use paper ballots during early voting? You would  
17 rather use --

18 **A.** Yes. It is just more -- it is more complicated.

19 **Q.** Mr. Barron, if we were to switch to paper ballots for the  
20 November election, are you aware of whether or not you would  
21 have to have more rules implemented by the State Election  
22 Board?

23 **A.** You broke up. What was the last part?

24 **Q.** Are there sufficient rules by the State Election Board to  
25 govern a paper ballot election for November, or would there

1 need to be more rules adopted by the State Election Board?

2 **A.** I would imagine the State Election Board would have to  
3 adopt rules. I can't be specific as to what they would be.  
4 But that would be a major change.

5 **Q.** We know that we had some concerns and problems with poll  
6 worker training for our June election.

7 Is the poll worker training that you have now conducted  
8 for -- or are conducting for the November election sufficient  
9 if we were to switch to paper ballots?

10 **A.** We would have to -- we would have to basically adopt the  
11 emergency procedures that we have that we trained on. Those  
12 would have to be -- we would have to, I guess, adapt those  
13 to -- and revamp our training procedures to make that the  
14 primary mode of voting.

15 **Q.** Just one more question about, I guess, paper ballots. Do  
16 you have the necessary provisions that would be needed to  
17 receive, capture, and safehold an all paper ballot election?

18 **A.** We would have to acquire some things. If we were able to  
19 use the paper ballot scanners, we would be able to -- the  
20 current ones, then we wouldn't have to get ballot boxes.

21 But I'm sure there are quite a few things -- I haven't run  
22 a paper ballot election in a while. So I'm sure there are  
23 quite a few things that we would have to acquire between now  
24 and election day.

25 THE COURT: I think in the interest of efficiency, we

1 had a lot of testimony about some of the challenges of this.  
2 And I think I can -- all counsel were present. So I think I  
3 can refer to that, if that is what you are trying to get at.

4 MS. RINGER: I was actually done with that subject  
5 matter, Your Honor. I was moving to the Poll Pads next.

6 **Q. (BY MS. RINGER)** So, Mr. Barron --

7 THE COURT: As you go back to the Poll Pads,  
8 Mr. Barron spoke about the problems they were having and it was  
9 duplicated in these other counties.

10 Could you get that clarified for me because it went  
11 very fast by me.

12 MS. RINGER: Okay.

13 **Q. (BY MS. RINGER)** Mr. Barron, could you go back and explain  
14 to the Court what happened with early voting with the Poll  
15 Pads.

16 **A.** Essentially, if someone came in to vote in certain  
17 precincts that -- you have to get -- the Poll Pad only  
18 activates the activation card or the voter card during early  
19 voting. Once one person had checked in in one of about six or  
20 seven precincts, what was indicated to the poll worker is that  
21 the voter in front of them had already had a card activated or  
22 essentially had already -- had already voted.

23 So we were unable to activate cards for certain precincts.  
24 And at that point, you have to go into a procedure where you  
25 have activation codes on the ballot-marking devices that allow

1 the voter -- allow the voters to -- they basically manually  
2 activate it on the BMD. And from there, then the voter will  
3 vote and print out the ballots. So it bypasses the Poll Pad.

4 We had notified the vendor on August 29th that we saw this  
5 when we were testing it in the warehouse. They gave us a  
6 recommended action because they said the configuration file had  
7 an error in it. We did the hard reset that they told us to do,  
8 and we tested it in the warehouse.

9 But then on Tuesday morning, once multiple people tried to  
10 check in in certain precincts, that same issue arose. So we  
11 had to send out what are called a cradle point and do a hard  
12 reset again on those Poll Pads.

13 We haven't had the issue since. But this was an issue in  
14 four precincts on election day in August as well. And we did  
15 confirm with Clayton because we wanted to know if it was just  
16 us or Clayton County and Dekalb County experienced the same  
17 issue. And they indicated to us that they did have the same  
18 problem on Tuesday.

19 **Q.** So with regards to the remedy that plaintiffs are asking  
20 for here for a paper backup to the express -- I'm sorry -- the  
21 electronic pollbooks, would a paper backup have been -- would  
22 that have been a remedy that would have resolved the issue that  
23 you just described?

24 **A.** During early voting -- it wouldn't have resolved the issue  
25 during early voting. Now, if it crops up on election day, it

1 would help.

2 During early voting, we are using -- we use laptops. And  
3 we can connect to one of two places to check in voters, either  
4 with Easy Voter Election Net -- so we already have a backup.

5 If you do a paper pollbook for early voting, I mean, we  
6 always -- we have a voters list in there anyway for early  
7 voting.

8 I think what the plaintiffs want is the paper pollbook for  
9 election day, which I don't have an issue with that. I think  
10 what they want is for it to be updated through the end of early  
11 voting. And we usually get the file from the State, I would  
12 say, probably a week and a half before early voting concludes.  
13 So it isn't up to date.

14 The more voters you have that are marked that have voted  
15 the fewer calls you -- the precinct is going to have to make to  
16 your call center. That is what that would eliminate.

17 **Q.** Let me make sure I understand what you are saying. You  
18 receive a list, and you can provide a paper backup for election  
19 day, but it won't be up to date? Is that accurate?

20 **A.** The one that we receive from the State currently is  
21 usually produced midway through early voting. So not all of  
22 the voters that have voted are in that. I think they that do  
23 in order to give us time to get that printed.

24 So if we do it at the end of early voting to get that  
25 paper pollbook updated, we have to do it on the Saturday before

1 we hand out the supplies. That would put more voters -- it  
2 would make the list more accurate as to who has voted and who  
3 still is eligible to vote if you do it at the end of early  
4 voting. You just have to make sure you get that print job that  
5 has to be done beginning on Saturday morning when the voter  
6 file is made available.

7 **Q.** Do you have any concerns about being able to conduct that  
8 print job after early voting and get it distributed before  
9 election day?

10 **A.** As long as a -- as long as we can get the file to a  
11 commercial printer and they can get it done on that Saturday,  
12 that is fine. If for some reason the printer, you know, has  
13 some sort of an issue, then you -- you run into -- you run into  
14 getting -- making sure everything is done before we start  
15 handing out supplies on Sunday.

16 **Q.** Would --

17 **A.** We -- you know, I think when I was an administrator in  
18 Texas, we would produce it on Saturday in one of the two  
19 counties I worked at. But it was -- at that point, you know,  
20 20 years ago, that was an all-day -- all-day print job. And  
21 there were, I think, a couple of occasions when we had to  
22 deliver -- deliver paper pollbooks out on Monday because  
23 everything wasn't ready.

24 **Q.** Would the provision of this paper pollbook backup  
25 eliminate the need for your poll workers to have to call in if

1 there was an issue with the electronic pollbooks?

2 **A.** It wouldn't eliminate it. The more updated it is I guess  
3 the better -- you know, the fewer calls they are going to have  
4 to make.

5 **Q.** What else would need to be updated after the close of  
6 early voting?

7 **A.** Well, you want to make sure you have all of the absentee  
8 by mail -- anybody that submitted an absentee by mail ballot  
9 back that we received, those would -- those would need to be  
10 updated and then those that have early voted.

11 Most of those -- you are going to get -- anything through  
12 Friday, those voters will be in the paper pollbooks. So the  
13 more accurate you can get the list, the better it is for our  
14 call center or us in taking calls.

15 It also would cut down the number of calls the poll  
16 managers have to make to our office.

17 **Q.** Have you implemented any additional processes or anything  
18 to deal with issues with poll workers being able to call in  
19 since June 2020? Have you implemented any policies or  
20 practices regarding poll workers being able to reach you on  
21 election day?

22 **A.** Well, I mean, we are adding -- we had -- because of social  
23 distance requirements in June, we only had one call center that  
24 have 32 people in it. So we will have three call centers with  
25 over a hundred people for November.

1 MS. RINGER: Thank you, Mr. Barron. I don't have any  
2 more questions.

3 MR. TYSON: Your Honor, Ms. Ringer covered most of  
4 what I was going to ask. I'll be brief.

5 CROSS-EXAMINATION

6 BY MR. TYSON:

7 **Q.** Mr. Barron, Bryan Tyson for the State defendants. Good to  
8 see you.

9 Are you aware that the issue with the Poll Pads related to  
10 a typo in the data field that was discovered on Saturday?

11 **A.** What we were told was that it was an error in the  
12 configuration file. I don't know the detail of what caused it.

13 **Q.** And that issue was repaired quickly by the vendor;  
14 correct?

15 MR. BROWN: Object. Leading.

16 MR. TYSON: He is not my witness.

17 **Q. (BY MR. TYSON)** Was that issue repaired by the vendor,  
18 Mr. Barron?

19 **A.** Well, based on what happened on Tuesday, I'm unsure  
20 because we -- we conducted the hard -- we completed the hard  
21 reset. And the report that we received from the vendor on  
22 Tuesday contradicts what the guys in my warehouse -- the  
23 procedures they said they went through and the testing they  
24 did.

25 And then we received on -- I think either it was Tuesday



1 night or Wednesday we received a report that indicated that we  
2 didn't -- that the Poll Pads that reset never connected. But  
3 they -- what frustrates, I guess, my warehouse is that there is  
4 this ePulse dashboard out there that we don't have access to as  
5 a county. And it gives you the information on the Poll Pads.

6 The Poll Pads -- if we -- we could have had that  
7 information and it says that something doesn't connect  
8 properly, that would enable us to be able to see what the  
9 vendor is seeing and would make the process more efficient.

10 So I mean, my -- my hope is that at some point the  
11 counties can get access to this ePulse dashboard in order for  
12 us to see what is happening with our Poll Pads that we assign  
13 to the field. Because right now we have to send everything  
14 through the vendor. So it takes time to get that information  
15 back.

16 And in this case, it seems to contradict what my warehouse  
17 managers did. And so it gets to be that there is this  
18 conflict. And it doesn't seem that it is intuitive to the  
19 whole process not to have access to that ePulse dashboard.

20 **Q.** Thank you. My question is actually simpler.

21 Is early voting proceeding right now without any issues on  
22 the Poll Pads?

23 **A.** Yes.

24 **Q.** And in early voting, the Poll Pads are -- are the Poll  
25 Pads used to check in voters or only to encode the access

1 cards?

2 **A.** Only to encode the access cards.

3 MR. TYSON: Thank you. I don't have any further  
4 questions.

5 THE COURT: Any follow-up from plaintiffs' counsel?

6 MR. BROWN: No, Your Honor.

7 THE COURT: I have a few questions especially in  
8 light of Fulton County attorney's questions and also  
9 Mr. Tyson's last question.

10 EXAMINATION

11 BY THE COURT:

12 **Q.** In early voting, you are not using the Poll Pads for  
13 checking in a voter. But in -- on the general election day,  
14 aren't you using it?

15 **A.** Yes. On election day, we use it to check in voters.  
16 Early voting has a different -- has different procedures.

17 **Q.** All right. And it is really on the general election day  
18 that you end up having or on -- whether it is the general  
19 election or primary day in June, that's when you end up having  
20 a more congested line of voters? Would that be fair to say?

21 **A.** Yes.

22 **Q.** Okay. And as I understand it, especially for highly  
23 populated area such as Fulton County, then you also -- you  
24 don't have endless poll workers. So people when they have to  
25 spend time phoning the central office -- that takes up time as

1 well and jams up the lines more as well as any dysfunction you  
2 have with the pollbook. Would that be fair to say?

3 **A.** Yes.

4 **Q.** All right. So I think the most basic question is  
5 obviously printing is much faster than it was 20 years ago.

6 I understood your testimony to be that you thought it  
7 would be helpful and might move things along faster so you  
8 didn't have these jam-ups if you had actually an up-to-date  
9 list -- listing that came out on Saturday or at worst case on  
10 Sunday for you of voters -- who has voted and who has not in  
11 your precinct -- whoever is going to be voting.

12 Did I understand you correctly?

13 **A.** Yes. I mean, we -- I have experience with an up-to-date  
14 paper pollbook. So I think it is helpful. You know, other  
15 than just getting it printed on Saturday, which is the day  
16 before we hand out supplies -- other than that, there really is  
17 no reason not to have the most updated paper pollbook.

18 **Q.** Now, if your pollbooks go down in a congested situation,  
19 could you rely on checking people in with the -- and giving  
20 them an emergency backup with the benefit of seeing the list?

21 **A.** Yeah. I think you would want to have -- the thing the  
22 Poll Pads -- the nice thing about the Poll Pads is that they  
23 give you the statewide list so that you can tell people that  
24 are -- or if you have one just for the precinct -- you really  
25 need a countywide list, and you probably need multiple lists

1 really. If you want to be able to check people in if all the  
2 Poll Pads fail, you need to have enough paper precinct lists to  
3 check the voters in. If you have one, you are going to be able  
4 to do it but it is going to be a slower process.

5 **Q.** Having faced the challenges that you did in June and if  
6 you end up having this sort of crisis, was there any reason --  
7 is this a viable strategy, at least, so that you don't have  
8 people potentially disenfranchised because they can't stay and  
9 stand for two and three and four hours?

10 **A.** To have multiple paper pollbooks?

11 **Q.** That you are then giving them an emergency ballot.

12 **A.** Yes. I mean, you still -- you know, the way -- the way I  
13 read that SEB rule, it says you shouldn't have -- you know, if  
14 you have any of these emergencies like power outages,  
15 malfunctions, the markers unavailable for use, or waiting times  
16 longer than 30 minutes, you know, you still -- before you hand  
17 out the emergency ballots, you have to check people in.

18 So I mean, I have always interpreted that waiting time is  
19 longer than 30 minutes to be -- to get to the BMD rather than  
20 to check in. Because you can't hand out the emergency ballots  
21 unless you can get the voter checked in.

22 There would be situations where you could have people  
23 waiting for BMDs where you are checking people in fast enough  
24 but the BMDs aren't available because the ballot is long. And  
25 at that point it makes sense to hand out paper -- emergency

1 paper ballots.

2 If it is before the voter -- if you have a long line but  
3 don't have voters checked in, you can't hand out the ballots.

4 **Q.** So is that something on your mind though? I mean, I guess  
5 what -- beyond, I guess, planning this -- I mean, I'm not  
6 talking about 30 minutes. I'm talking more about the people  
7 who are in line for 90 minutes. They can't check in because  
8 you don't have enough functional --

9 **A.** Poll Pads.

10 **Q.** -- Poll Pads.

11 **A.** Yeah. I think the solution to that would be to have  
12 multiple -- multiple paper pollbooks in the precincts. I mean,  
13 that would be the remedy. That way you could cut a line down  
14 pretty quickly if you have extra paper pollbooks and you have  
15 ballots -- emergency ballots.

16 THE COURT: Thank you.

17 All right. May this witness be excused?

18 MR. BROWN: Yes, Your Honor.

19 MR. TYSON: Yes, Your Honor.

20 MR. BROWN: Thank you, Mr. Barron.

21 THE WITNESS: Thank you. Thank you, Your Honor.

22 THE COURT: Thank you. Safe travels.

23 THE WITNESS: Thank you.

24 THE COURT: And the next witness is?

25 MR. BROWN: Mr. Russo needs to be unmuted.

1 MR. RUSSO: Thank you, Bruce.

2 MR. BROWN: You are welcome.

3 MR. RUSSO: Your Honor, our next witness -- State  
4 defendants' next witness is Chris Harvey.

5 There he is. Good afternoon, Mr. Harvey.

6 THE WITNESS: Good afternoon.

7 MR. RUSSO: Your Honor, do you want to swear the  
8 witness?

9 THE COURT: I'll swear the witness.

10 Good afternoon, Mr. Harvey. Would you raise your  
11 right hand.

12 **(Witness sworn)**

13 THE COURT: Tell us what your location is at this  
14 time.

15 THE WITNESS: I'm in my office in the Secretary of  
16 State's office just down the street.

17 THE COURT: All right. In Atlanta?

18 THE WITNESS: Yes, ma'am.

19 THE COURT: Very good. Do you want to commence?

20 MR. RUSSO: Yes, ma'am.

21 Whereupon,

22 CHRIS HARVEY,

23 after having been first duly sworn, testified as follows:

24 DIRECT EXAMINATION

25 BY MR. RUSSO:

1 Q. Good afternoon, Mr. Harvey. Can you please tell us what  
2 your current position is with the Secretary of State's office?

3 A. I'm the elections director with the Georgia Secretary of  
4 State's office.

5 Q. What are your responsibilities as the elections director  
6 in the Secretary of State's office?

7 A. It is coordinating elections that go on throughout the  
8 State -- most of the elections that go on throughout the State;  
9 running at the elections division; coordinating with other  
10 state agencies; with federal agencies like the EAC; making sure  
11 that we provide essentially the hardware, training materials;  
12 essentially create the atmosphere where counties can conduct  
13 elections.

14 Q. And how long have you been involved in elections in the  
15 Secretary of State's office?

16 A. Well, I started with the Secretary of State's in 2007. I  
17 was the chief investigator from 2007 to 2015. And much of my  
18 focus then was on election investigations. And then in July of  
19 2015, I was appointed the elections director.

20 Q. I want to turn to just the upcoming election and the  
21 elections schedule.

22 At a high level, could you give us an overview of the  
23 election schedule for the November 3rd election.

24 THE COURT: Mr. Russo, your voice suddenly went in  
25 some alternate reality. There is an echo.

1 MR. RUSSO: Your Honor, I hope we don't have another  
2 situation like last time.

3 Is that better?

4 THE COURT: No. It is about the same.

5 MR. RUSSO: Okay.

6 THE COURT: I can hear you. It is just sort of a  
7 whole different register somehow.

8 Shannon, can you properly record this? If everyone  
9 can hear it, it is fine.

10 MR. RUSSO: Maybe if I mute and unmute, it will pick  
11 up my mic better. I can try that.

12 THE COURT: All right. Thank you.

13 THE WITNESS: Do you want me to go ahead and answer  
14 the question regarding the --

15 THE COURT: Let's just make sure we have Mr. Russo  
16 here.

17 So you want to unmute -- Ms. Cole is not there to  
18 unmute you now for a second.

19 All right. Hold on.

20 MR. RUSSO: Sorry about that.

21 THE COURT: Now you are unmuted. Let's hear you  
22 again.

23 MR. RUSSO: Okay. Is that any better?

24 THE COURT: About the same. It is sort of -- it put  
25 your voice at a higher register. We can understand, I think.



1 Ms. Welch, are you able to take it down?

2 All right. Go ahead.

3 MR. RUSSO: How about now?

4 THE COURT: That's not bad. There was something  
5 better there when --

6 MR. RUSSO: Maybe if I move -- okay. I will not  
7 move.

8 **Q. (BY MR. RUSSO)** Mr. Harvey, go ahead. I'm sorry.

9 **A.** Sure. The voter registration deadline is October 5th.  
10 The first day of advance voting is October 12th. The election  
11 day, of course, is November 3rd. UOCAVA deadline to get  
12 ballots out to the military and overseas voters is  
13 September 19, which is a week from today -- week from tomorrow.  
14 And poll worker training is going to commence shortly.

15 And counties are -- we're working with the counties now to  
16 do some analysis on their equipment -- distribution equipment  
17 assignment and voter populations so that hopefully we can make  
18 sure that there is enough equipment at the polling places so  
19 they can keep everyone moving.

20 So the election is -- although voting hasn't technically  
21 started, ballots haven't gone out, everybody is starting on  
22 ready to go.

23 **Q.** And when does the ballot printing process begin?

24 **A.** That begins -- that began awhile ago. That began in mid  
25 to late August. For the counties that didn't have runoffs, our

1 Center for Election Systems began building the ballots in the  
2 middle of August. I think August 14. And then for the  
3 counties that were having runoffs, they went ahead and started  
4 building ballots minus anything that needed to be decided. So  
5 if you had a runoff in one race, they would leave that race  
6 unprinted but create the database around it.

7 It is a fairly time-consuming and tedious process to proof  
8 absentee ballots -- I'm sorry -- to proof ballot databases and  
9 ballot prints. And so there is some back-and-forth between the  
10 ballot builders at the Center for Election Systems and the  
11 counties sometimes switching it back and forth a couple of  
12 times before they get it right. So that process began in  
13 August and is finishing up now.

14 **Q.** And how many different ballot styles are there or will  
15 there be for the November election?

16 **A.** Well, it depends on the county. Just, for example, Cobb  
17 County has 80 different ballot styles. Fulton County has over  
18 100 ballot styles.

19 When we talk about ballot styles, those are just the forms  
20 of the ballot. If you talk about what -- Center for Election  
21 Systems talk about ballot instances. Within precincts, it goes  
22 up almost exponentially from there.

23 Fulton County, with over 100 ballot styles and their 300  
24 some precincts, ends up with over 700 ballot instances. So  
25 those are 700 different pieces of paper that you need to serve

1 every voter in Fulton County.

2 **Q.** Okay. So can you explain a little more about what a  
3 ballot instance would be then.

4 **A.** Well, even if you had two polling places or two precincts  
5 that were side by side and they had the same candidates on  
6 them, even though they may look the same on their face, every  
7 vote in Georgia has to be assigned to a precinct. So the  
8 timing marks around the ballot would separate, you know,  
9 precinct 21 from precinct 22.

10 And so you have to vote in your precinct. So, you know,  
11 the 102 is the total number of different faces, I guess, of a  
12 ballot. But then when you put those into different precincts,  
13 each one has to be in its own precinct -- has to be printed for  
14 its own precinct.

15 **Q.** And Mr. Barron somewhat touched on the logistics of  
16 hand-marked paper ballots during early voting.

17 Could you -- could you explain, you know, if we had all  
18 hand-marked paper ballots during early voting, how would the  
19 logistics work for an elections official.

20 **A.** It would be -- it would be very, very challenging,  
21 especially in the large counties. You have over 700 piles of  
22 ballots in Fulton County in an advance voting location. And  
23 you have to have a poll worker that makes sure they got the  
24 right -- they got the right ballot out of 730-some stacks.

25 In Gwinnett County, it would be even worse because

1 Gwinnett County has a two-page ballot. And each of those -- so  
2 that would double the number in Gwinnett. Cobb County with 80  
3 ballot styles has a couple hundred ballot instances.

4 So the printing, the transporting, the securing, the  
5 organizing, and then the selection by poll workers to make sure  
6 they get the right ballot for the right precinct for the right  
7 voter would be -- would be a huge challenge.

8 **Q.** Do you have any idea how many ballots would have to be  
9 printed?

10 **A.** For advance voting?

11 **Q.** For advance voting to be able to have all hand-marked  
12 paper ballots.

13 **A.** I don't have an exact number. I know that advance voting  
14 up until this election comprised about 50 percent of the votes  
15 that were cast. We're expecting a very, very heavy turnout.  
16 We're telling the counties to get ready for a very, very heavy  
17 turnout, you know, of up to 400 -- I'm sorry -- 4 to 5 million  
18 voters.

19 And so with three weeks of advance voting, you know, the  
20 large counties in the metro area are often going seven days a  
21 week or at least six days a week, including weekends on  
22 Saturday and Sunday. You would need to have hundreds of  
23 thousands of ballots -- ballot pieces of paper printed and  
24 transported, secured, organized, and train the people that are  
25 giving them out to make sure they get it right.

1           It would be a major undertaking.

2   **Q.**   On election day, how would this process using hand-marked  
3   paper ballots differ from early voting?

4   **A.**   Well, election day would be easier because you would  
5   generally have fewer stacks of ballots to go. You would have  
6   some combined precincts where you may have, you know, four to  
7   five to six different stacks you would need to select from.

8           So it would certainly be easier than advance voting  
9   because that too would require the poll worker to make sure  
10   that they access the right ballot and present it to the voter  
11   and not make a mistake in that process.

12   **Q.**   In terms of -- I mean, we heard earlier -- I believe  
13   opposing counsel had asked Dr. Coomer about printing companies,  
14   printing vendors for Dominion.

15           Are you -- are you involved at all in the process of  
16   working with the vendors to print ballots?

17   **A.**   No. Our office is not. I'm not.

18   **Q.**   Okay.

19   **A.**   Let me clarify just a little bit. The Center for Election  
20   Systems creates the ballot. They send the file to the printers  
21   so the printers can print for the counties. But that is  
22   basically the extent. As far as ordering ballots, no, we're  
23   not involved in that.

24   **Q.**   Now, the Center for Election Systems, is that under the  
25   elections division in the Secretary of State's office?

1     **A.**    It is not under the elections division.  It is a separate  
2     division in the Secretary of State.

3     **Q.**    Okay.  I just want to I understand that -- make sure we  
4     understood that.

5           Now, Mr. Barron had discussed earlier an issue with early  
6     voting in the CD 5 special election -- Congressional District 5  
7     special election.

8           Are you familiar with that issue?

9     **A.**    I am.

10    **Q.**    And to the extent you can talk about it -- I don't know if  
11    there is any SEB -- is there an SEB investigation going on  
12    around that?

13    **A.**    I don't believe so.

14    **Q.**    I just didn't want you to talk about necessarily something  
15    that, you know, we might need to be delicate around.

16           Do you know what happened?

17    **A.**    My understanding is that when the -- there was an error  
18    that was discovered in the file -- some technical error and the  
19    Poll Pads had to be reset.  The vendor, KNOWiNK, provided the  
20    instructions to reset the -- I think do a hard reset or  
21    upload -- do something.  They gave the county instructions to  
22    do that.

23           My understanding is the county believed they had done it.  
24    But the KNOWiNK records indicated that while some of the Poll  
25    Pads had been updated some of them had not.

1           So whether it was the county not realizing they hadn't  
2     done it or not communicating back that it had been completed --  
3     but in some cases, the process wasn't complete. That is where  
4     they had a problem. And that is why they had to go out on the  
5     day and update the Poll Pads there.

6     **Q.**   And voter registration deadline for special election --  
7     that is not the same deadline for, say, the August runoff;  
8     right?

9     **A.**   Correct. It is essentially 30 days before whatever  
10    election.

11   **Q.**   So --

12   **A.**   The September 29 deadline is a deadline unto itself.

13   **Q.**   So the Poll Pad or the pollbook would need to be updated  
14    with all the new registrants; right?

15   **A.**   Correct. And in advance voting, the Poll Pad doesn't even  
16    check in voters. The only thing the Poll Pad does for advance  
17    voting is to create the voter access card.

18           So even now, although there are Poll Pads at the polling  
19    places for advance voting, they are only being used to create  
20    voter access cards.

21   **Q.**   Now, another issue that we briefly touched on earlier is  
22    the paper electors list. Can you give us a general overview of  
23    what is an electors list?

24   **A.**   The electors list is every voter in the county by  
25    precinct. It is something that we are required to provide to

1 the counties by law. It is a long process. It is a big  
2 printing job, as you may imagine, for Fulton County, Dekalb,  
3 Clayton, Cobb Counties with the hundreds of thousands of  
4 voters. So we have got to produce 159 of them for the  
5 counties.

6 And we usually start that soon after the voter  
7 registration deadline. We try to work with the counties so  
8 that they can get in as many of the voter registration  
9 applications that have come in before the deadline but haven't  
10 been entered. Because the more that can be entered into eNet,  
11 the more complete the list is going to be.

12 So generally we ask the counties to let us know when you  
13 are done with your voter registration applications. And then  
14 we go ahead and we order the list. It gets printed by a vendor  
15 and shipped to the county.

16 You know, the longer you wait to do that, the more data  
17 you get on there when they are done. But it just takes a  
18 while.

19 MR. RUSSO: Mr. Brown is waving his hand. I'm sorry.

20 THE COURT: Holly, could you -- yes.

21 MR. BROWN: I am unmuted now. And my objection is  
22 moot since the witness is done. So --

23 THE COURT: All right.

24 MR. BROWN: Thank you. Thank you, Ms. Cole.

25 THE COURT: If you are going to be the one who is



1 raising objections, why don't we just leave him --

2 LAW CLERK COLE: They are muting themselves. And  
3 because the default cannot let all the participants unmute  
4 themselves, that is the issue.

5 THE COURT: I see.

6 LAW CLERK COLE: If they don't mute themselves when  
7 they are going to be the ones making objections, that would be  
8 the easiest thing for now.

9 THE COURT: All right. Everyone is so advised.

10 **Q. (BY MR. RUSSO)** Mr. Harvey, do you have an idea of the  
11 number of pages that the electors list is that has to be  
12 printed out?

13 **A.** Of course, it varies by county. Again, each page has  
14 about 20 or 25 voters on it. So, you know, if you take 800,000  
15 by 20, 25 divided and that will give you the approximate number  
16 of pages.

17 THE COURT: I'm sorry. I completely missed what you  
18 were saying.

19 THE WITNESS: Ma'am, I was saying that the question  
20 was how many pages the electors list is. And I said that, of  
21 course, it varies by county the number of voters. But each  
22 page of the electors list has, I believe, 20 or 25 names. So  
23 in a place like Fulton, you take the 800,000 or so divided by  
24 25, and that will give you the number of pages.

25 **Q. (BY MR. RUSSO)** So statewide that number -- how many

1 voters, if you know, are registered statewide?

2 **A.** If you go with the seven and a half million or so voters  
3 divided by 25 is how many pages the whole list is.

4 **Q.** I get it. Now, if paper ballots -- actually the paper  
5 electors list were to be printed in the time after the close of  
6 early voting ended, in your experience, would that be possible?

7 **A.** It would be -- it wouldn't be possible to do -- to be done  
8 the way we currently do it. If a -- if a county could get the  
9 list and get it printed itself by some print company, I suppose  
10 it is possible.

11 Again, I'm not familiar with how long it would take to  
12 print a list with the number of voters Fulton County has. But  
13 presumably if a printer could do it, they could do it. But we  
14 couldn't do it the way we do it now.

15 **Q.** And the Secretary of State's office provides one list to  
16 each county?

17 **A.** That's correct.

18 **Q.** And are counties able to print their -- make copies of  
19 that list?

20 **A.** They could. Yes.

21 **Q.** Okay. I want to turn to the absentee ballots and  
22 tabulation of absentee ballots.

23 Are you familiar with the scanning process of hand-marked  
24 paper ballots?

25 **A.** Generally, yes.

1 Q. Are you aware of reasons an absentee ballot may not be  
2 able to be scanned?

3 A. Yes.

4 Q. And are you aware of -- well, can you tell us some of  
5 those reasons?

6 A. Well, in terms of not being able to scan, if it was torn,  
7 if it was creased, if it was -- if it was wet -- if it got  
8 somehow wet, it wouldn't go into the scanner. The scanner  
9 wouldn't accept it. So that is sort of the first case.

10 The second case would be where it would go into the  
11 scanner but then for some reason the scanner may not be able to  
12 read what is on the ballot.

13 Q. Okay. What would be a situation where the scanner would  
14 not be able to read what is on the ballot?

15 A. Well, if it didn't detect any marks in the area of the  
16 target area where it is looking for votes, it would -- it  
17 would -- I mean, it wouldn't be able to read anything because  
18 it is not seeing anything.

19 If it could -- it could kick back a ballot if there were  
20 extraneous marks, if there were overvotes in a race, or if  
21 there were some other problem reading the ballot for some  
22 reason. If the ink had gotten smudged, again if something wet  
23 had gotten on it and it smeared some of the timing marks, it  
24 could well -- very well not be able to be read.

25 Q. Now, can you describe for us the duplication process that

1 occurs?

2 **A.** Sure. If a ballot is kicked back for some reason, either  
3 because it has an overvote, it has got a stray mark, the law  
4 requires a ballot review committee to evaluate that ballot.  
5 And it is made up of the election superintendent. And then in  
6 a partisan election, you have a representative of each of the  
7 parties. They would look at the ballot either by hand holding  
8 it out in front of them or they could do it on a digital screen  
9 in our new system.

10 And it would be up to that three-person panel to determine  
11 what was happening. Is there a clear intent of a voter to cast  
12 a vote for this person? Is it clearly a stray mark where  
13 somebody's pen may have just drifted across an area where there  
14 was otherwise a clear mark of the voter? Or if they couldn't  
15 determine if there was a true overvote where somebody voted for  
16 two candidates in a race where they could vote for one, they  
17 would have to essentially declare it an overvote and not give a  
18 vote to anyone.

19 So once they come to that conclusion, the ballot is either  
20 duplicated physically, if they are doing what is called manual  
21 adjudication and physically holding and looking at the ballot,  
22 or in the digital adjudication they can actually adjudicate it  
23 on screen and give the credit for whatever they determine the  
24 vote to be.

25 **Q.** Now, you mentioned ambiguous marks. Did the State

1 Election Board pass a new rule on threshold -- on scanner  
2 threshold settings?

3 **A.** They did.

4 **Q.** And I want to show you what is --

5 MR. RUSSO: Ms. Cole, we have a document -- it has  
6 previously been filed as 793-1. And it is in the email that  
7 Mr. Miller sent to you.

8 LAW CLERK COLE: The State Election Board rule?

9 MR. RUSSO: Yes, ma'am.

10 THE COURT: While she's pulling that up, I'm going to  
11 just take one minute. All right. So just pause for one  
12 minute.

13 **(A brief break was taken at 1:54 P.M.)**

14 THE COURT: Go ahead. You can go ahead.

15 MR. RUSSO: Yes, ma'am.

16 THE COURT: Holly is not back. Never mind, you can't  
17 go back.

18 LAW CLERK COLE: I am here.

19 THE COURT: Go ahead.

20 MR. RUSSO: Thank you, Your Honor.

21 **Q. (BY MR. RUSSO)** Mr. Harvey, I'm showing you what has been  
22 filed in this case already. And it is the notice of intent to  
23 post rule of the State Election Board.

24 Have you seen this before?

25 **A.** Yes, I have.

1 Q. Are you familiar with what this is?

2 A. Yes.

3 Q. And tell us what this is.

4 A. This is a notice -- a public notice that the State  
5 Election Board is going to consider adopting a rule and give  
6 the opportunity for citizens to give public comments --

7 Q. Go ahead.

8 A. -- and just to see the process or join in the process.

9 MR. RUSSO: Ms. Cole, could you please scroll down to  
10 Page 4 of that document -- the ECF number Page 4. I don't know  
11 if Mr. Harvey can see. The rule starts at the bottom.  
12 Ms. Cole, if you could scroll down a little further. I'm  
13 sorry. It is for the start of the rule. That works.

14 Q. (BY MR. RUSSO) Mr. Harvey, I'm showing you what is the  
15 proposed rule. I just want to confirm because we don't have  
16 the promulgated version.

17 But is this version of the proposed rule -- is this the  
18 same as what the SEC promulgated?

19 A. The SEB did adopt the rule yesterday.

20 Q. Do you know if there were any changes to this -- to the  
21 proposed rule that was ultimately adopted?

22 A. There were not.

23 MR. RUSSO: You can take that down, Ms. Cole. Thank  
24 you.

25 We would like to -- I guess it is already in the

1 record. So it should be fine.

2 Your Honor, we would like to admit that. I don't  
3 know what number State defendants' exhibit we're on. But we  
4 would like to admit that.

5 THE COURT: Do you have an exhibit number on it right  
6 now?

7 MR. RUSSO: No, ma'am, I don't. I do not  
8 unfortunately. It is 9 -- Exhibit 9.

9 THE COURT: Exhibit 9. Any objection?

10 MR. RUSSO: We can file that later.

11 MR. CROSS: No, Your Honor. No objection.

12 THE COURT: Hearing no objection, it is admitted.

13 **Q. (BY MR. RUSSO)** Mr. Harvey, in developing that rule, did  
14 the Secretary of State's office conduct any kind of research or  
15 assess different threshold settings on the scanners to reach a  
16 number to propose?

17 **A.** Yes, we did.

18 **Q.** And do you know who all was involved in that process?

19 **A.** That was primarily done at the Center for Election  
20 Systems, which is run by Michael Barnes and his team. Ryan  
21 Germany, I believe, also is part of that, as was -- I believe  
22 Kevin Rayburn was too.

23 **Q.** I want to show you --

24 MR. RUSSO: Ms. Cole, if you could please put up the  
25 other document that is 887-4 that Mr. Germany -- excuse me --

1 Mr. Miller emailed to you.

2 Thank you. And could we scroll to the second page.

3 Thank you.

4 **Q. (BY MR. RUSSO)** Mr. Harvey, have you seen this document  
5 previously?

6 **A.** Yes, I have.

7 **Q.** And are you -- do you know who drafted this document?

8 **A.** Michael Barnes.

9 **Q.** Okay. And I know it says draft across the front. But  
10 is -- do you know if this document is -- was something that was  
11 used or compiled as part of the research for developing the  
12 rule?

13 **A.** It is my understanding that it did. I wasn't directly  
14 involved in the drafting of this. But I know when they were  
15 talking about that rule we were talking about performing some  
16 of these demonstrations and some of these tests to see what the  
17 scanning levels were.

18 MR. RUSSO: Okay. And, Your Honor, State defendants  
19 would like to have this admitted as Exhibits -- Exhibit 9 and  
20 not for the truth of the matter asserted, Your Honor. It is  
21 simply to show that -- to confirm that research was conducted.

22 THE COURT: Are there objections?

23 LAW CLERK COLE: Do you mean Exhibit 10? We just had  
24 -- the prior exhibit was Number 9.

25 MR. RUSSO: I'm sorry. One of my colleagues just



1 came in and said that would be Exhibit 4. We used that  
2 document yesterday, Your Honor. That was -- that document was  
3 used on the impeachment of Mr. Hursti. And there was a  
4 question then about being able to get it in through Mr. Hursti.  
5 So it is already Exhibit 4 on the record.

6 MR. BROWN: Your Honor, we would object. This  
7 witness knows nothing about this draft by Mr. Barnes. They did  
8 not want to call Mr. Barnes to defend it. But they would need  
9 to do so to get it into evidence.

10 MR. RUSSO: Your Honor, we're not -- this document is  
11 not for the truth of the matter asserted in the document. This  
12 document is merely to show that research was conducted. And  
13 Mr. Hursti had said yesterday regarding the threshold that the  
14 State should -- should not set a threshold without conducting  
15 research.

16 Mr. Harvey has seen this document and is aware of the  
17 research that was being conducted in the development of the  
18 rule. So it is not being provided for purposes of the contest  
19 but so much to show that there was research being performed.

20 THE COURT: Well, this is not a jury trial. So I'm  
21 going to admit it. I think that you are introducing it a  
22 little bit for the truth of the matter. It is not so -- you  
23 are trying to reflect that there was research done. And I  
24 don't know what the nature of the research was. But that is --  
25 but there is no point in not letting you get it in at this

1 point.

2 MR. RUSSO: Thank you, Your Honor.

3 Q. (BY MR. RUSSO) Now, Mr. Harvey, with respect to the SEB  
4 rule that was ultimately promulgated --

5 MR. RUSSO: And, Ms. Cole, you can take this down.

6 Q. (BY MR. RUSSO) Are you aware of the threshold settings  
7 that the SEB ultimately approved?

8 A. Yes, I am.

9 Q. What were those?

10 A. 10 low end, 20 percent high end.

11 Q. And I know you stated a minute ago that you -- in terms of  
12 scanner threshold settings that -- you know, that Mr. Barnes  
13 was involved in that.

14 But are you aware of additional research that was  
15 conducted outside of what Mr. Barnes -- Mr. Barnes performed?

16 A. Not -- I'm not aware of specific research that was  
17 conducted.

18 Q. So the Center for Election Systems performed the bulk of  
19 the work to determine the 10, 20 percent threshold?

20 A. That is my understanding. They did the -- they did the  
21 tests.

22 (There was a brief pause in the proceedings.)

23 Q. (BY MR. RUSSO) Mr. Harvey, I don't have much more to ask  
24 you about. But I do want to touch on the issue regarding the  
25 setting up of polling places.

1           You provided draft guidance for the counties on how to  
2 properly set up the BMDs in the polling places; is that right?

3     **A.**    That's correct.

4     **Q.**    Can you tell us -- explain to us what guidance you  
5 provided.

6     **A.**    Well, I had traveled to south Georgia to meet with some of  
7 the pilot voting in some of the early elections and special  
8 elections we had. And I noticed that some of the polling  
9 places -- and a lot of places were small, didn't have a lot of  
10 space. And sometimes they set the BMDs so that they were  
11 facing essentially where the people would come in.

12           And so I said, look, if everything else is equal, turn  
13 them a different way. Turn them so they face the wall or turn  
14 them so they face a different direction.

15           So I came up with a couple of sketches, which then  
16 somebody in our office actually made look nice. I didn't  
17 square the boxes and arrows. But just to show that -- you  
18 know, county election officials are sometimes creatures of  
19 habit. In the past, they would set up the DREs in a certain  
20 way. And they continued to set up the BMDs. And the BMDs had  
21 a different footprint. They are larger. They take up more  
22 space.

23           So I was really trying to get them to realize that just  
24 because you have always set them up facing this way it can  
25 still potentially pose a problem. If you can do a simple fix

1 like turn it a different direction, do that. Do everything you  
2 can to ensure the privacy and the secrecy of the vote.

3 **Q.** Are those -- are those layouts that you just described --  
4 are those attached to your declaration that you provided in  
5 this case?

6 **A.** Yeah. I believe so, yes.

7 MR. RUSSO: And, Your Honor, just for reference --  
8 we're not going to go back over them. But they are at Document  
9 834-3, Pages 8 through 11.

10 **Q. (BY MR. RUSSO)** Mr. Harvey, one last question -- well, two  
11 quick questions.

12 Do you know if the Secretary of State's office received  
13 any complaints during the June primary regarding the setup of  
14 BMDs?

15 **A.** I believe we did get -- we did get a handful of complaints  
16 along those lines.

17 **Q.** And is this something that the SEB if you know has the  
18 authority to -- well, I should back up.

19 Is the SEB investigating those complaints?

20 **A.** I'm not sure at this point. Some of the complaints go to  
21 the investigation division, and they would decide whether or  
22 not to open an investigation depending on the nature of the  
23 complaint. I don't know that there is a specific investigation  
24 on that issue open currently.

25 MR. RUSSO: Okay. No more questions, Your Honor.

1 MR. CROSS: Your Honor, David Cross. May I proceed?

2 THE COURT: Yes.

3 CROSS-EXAMINATION

4 BY MR. CROSS:

5 Q. Good afternoon, Mr. Harvey.

6 A. Good afternoon, Mr. Cross.

7 Q. You testified a little while ago that to use hand-marked  
8 paper ballots as the primary voting method on election day or  
9 in early voting the poll workers would have to be trained on  
10 that to make sure they give out the right ballots, for example,  
11 you said; right?

12 A. Yes.

13 Q. They are already trained to do that -- right? -- because  
14 of your emergency paper ballot backup?

15 A. Well, they are trained on the concept of doing it. It is  
16 up to the counties to make sure that they execute the actual  
17 training. And the poll worker training -- keep in mind when  
18 somebody does the poll worker training, they are generally  
19 getting training on the large system.

20 But, for example, if you went to a polling place, you  
21 would have to identify where the ballots were, you would have  
22 to make sure they are labeled, and you have to do that. So  
23 there would be extra steps that are required.

24 But I agree that generally they should be familiar with  
25 the process of handing out paper ballots.

1 Q. Mr. Harvey, just to be clear, the emergency paper ballot  
2 plan that is distributed by the State to the counties requires  
3 voters -- it states, voters shall scan their ballot in the  
4 scanner connected to the ballot box, just like a BMD ballot;  
5 right?

6 A. Yes.

7 Q. And so -- and we're talking about emergency ballots that  
8 are marked by hand; right? You understand what we're talking  
9 about?

10 A. I do.

11 MR. RUSSO: Your Honor, I'm going to go ahead and  
12 object that this is outside the scope of direct. I did not ask  
13 Mr. Harvey about emergency paper ballots.

14 MR. CROSS: Your Honor will recall we deferred him to  
15 their case. It is not a proper objection.

16 THE COURT: Go ahead.

17 Q. (BY MR. CROSS) Did I understand you to say that the CES  
18 creates the ballots?

19 A. Yes. When I say create, they create the database that the  
20 ballot results in. So they would create the database that  
21 either ends up on a BMD or that gets sent to the printer for a  
22 paper ballot. But they don't print the ballots themselves.

23 Q. Who creates the ballots? CES or Dominion?

24 A. I'm sorry. CES or --

25 Q. Who creates the ballots for Georgia? Is it CES, or is it

1 Dominion?

2 **A.** Well, CES is working with Dominion to create the ballots.  
3 Dominion is providing training and guidance so CES would be  
4 able to do it independently. But Dominion is working with  
5 them.

6 **Q.** Do you have an idea of how many ballot-on-demand printers  
7 are available across the state roughly?

8 **A.** I know every county has one. So that would be 159. And  
9 some of the larger counties have four or five. So probably  
10 another 50 or so. So I would say probably between 200 and 250.

11 **Q.** And the ballot-on-demand printers enable the poll workers  
12 to print whatever ballot style is needed for any particular  
13 voter who shows up to vote, if it is needed; right?

14 **A.** Well, the ballot-on-demand printer is generally kept at  
15 the election office. So when you are talking about poll  
16 workers doing it, it is not something that would be at a  
17 polling place for a poll worker to operate. But it does allow  
18 the operator to print any ballot.

19 **Q.** Thank you. When a ballot is flagged as ambiguous in the  
20 system, there is an adjudication or voter review panel who  
21 reviews that ballot to determine whether it can figure out the  
22 intent of the voter and whether that vote should count; right?

23 **A.** That's correct.

24 **Q.** Do I understand correctly that what the panel reviews is  
25 the scanned image -- the low grade image from the scanner as

1     opposed to the paper ballot itself?

2     **A.**   Well, they can do it one of two ways.  They could review  
3     the actual ballot itself if they set it up for what is called  
4     manual adjudication.  Or they can do it through digital  
5     adjudication where they look at a copy of the scan of the  
6     ballot on a screen.  They can do it either way.

7     **Q.**   Is digital -- is that the default?  Is that how it is  
8     typically done in Georgia?

9     **A.**   Well, I don't think there is a default.  Each county  
10    decides.  I know in the first -- in the June election, some  
11    counties were hesitant to use the digital.  And so they stuck  
12    with the old-fashioned way.  But I think more of them have  
13    adopted digital.  But I couldn't tell you the percentage.

14   **Q.**   So if a digital scan in the low grade image did not pick  
15    up a selection by a voter, the panel wouldn't see that --  
16    right? -- if that is what they are looking at instead of the  
17    paper ballot?

18   **A.**   Well, the -- you are talking about the digital scan.  So  
19    are you talking about the digital image of the ballot?

20   **Q.**   Yes.

21   **A.**   If the -- well, the whole reason the image would be in  
22    front of the voter review committee is because it didn't -- it  
23    either picked up an overvote or it didn't pick up something or  
24    it picked up something it didn't see.  So that is what would  
25    get it in front of the committee.  And then the committee would



1 be looking at the image that was taken of the ballot passed  
2 through scan. So what got it in front of that committee could  
3 be any number of things.

4 **Q.** You have been the elections director for Georgia since  
5 2015; is that right?

6 **A.** That's correct.

7 **Q.** I didn't see any discussion in any of your declarations  
8 about any forensic examination or security assessment of the  
9 Dominion BMD system in Georgia; right? You don't discuss that?

10 **A.** I don't think I was -- I don't remember that as being part  
11 of any declaration.

12 **Q.** Are you aware that Fortalice Solutions -- I'm not going to  
13 ask you about the substance I just want to note.

14 Are you aware that Fortalice Solutions conducted some sort  
15 of assessment of the Dominion BMD system last fall?

16 **A.** I'm familiar they did one. I didn't know when it was  
17 done.

18 **Q.** Were you part of that?

19 **A.** I was not.

20 **Q.** Were you involved?

21 **A.** No.

22 **Q.** Have you seen that report?

23 **A.** I have not.

24 **Q.** Is it fair to say that you are not aware of any remedial  
25 measures that were taken as a result of that report?

1     **A.**     I don't know of anything that was done specifically as a  
2     result of the report.

3     **Q.**     As the Georgia elections director, do you know whether  
4     there has been any connectivity between the prior DRE GEMS  
5     system and the new BMD system?

6     **A.**     Any connectivity?

7     **Q.**     Yeah. Any connections, like wires connected, use of  
8     removable media, anything that would have created connectivity  
9     between the old system and the new.

10    **A.**     I'm not aware of any. I can't say it hasn't happened, but  
11    I'm not aware.

12                 MR. CROSS: Ms. Coomer -- I'm sorry. Ms. Cole, can  
13    we get Exhibit 37? If you would scroll down to the bottom of  
14    the first email in the chain. Thank you.

15    **Q.**     **(BY MR. CROSS)** Mr. Harvey, are you familiar with Dedrick  
16    Smith and Scott Tucker at Dominion?

17    **A.**     I'm familiar with Scott Tucker. I don't know that I know  
18    Dedrick Smith.

19    **Q.**     You see at the bottom there is an email from Dedrick Smith  
20    to Scott Tucker at Dominion that says, I was wondering if you  
21    could ask the State if there is a special USB they are supposed  
22    to be sending out to the counties to submit their L&A reports  
23    and the exports for election day. They have a USB that they  
24    normally send the export files on, but they are old.

25                 Do you see where I am?

1     **A.**     Yes.

2     **Q.**     If you come up, you will see Mr. Tucker forwards this on  
3     to Michael Barnes on January 15. Do you see that?

4     **A.**     I do.

5     **Q.**     And Michael Barnes is the head of CES for the State?

6     **A.**     Yes.

7     **Q.**     And Mr. Tucker writes, Michael, is the State providing new  
8     USB drives for the counties to send their L&A exports and E  
9     day -- E day is election day; right?

10    **A.**     I would assume so.

11    **Q.**     -- and election day exports to you, or should they use the  
12    USB drive they have from the previous system? Are you with me?

13    **A.**     I am.

14    **Q.**     And if you come up to the top, Mr. Barnes, the head of  
15    CES, writes back to Mr. Tucker at Dominion --

16           MR. RUSSO: Objection, Your Honor. If Mr. Cross  
17    wants to read this into the record, that is one thing. But  
18    Mr. Harvey is not on the email chain. He stated that he is  
19    not -- CES is not under his division and that he was not  
20    involved -- that he is not involved in this aspect of running  
21    the elections.

22           THE COURT: He's being asked about what was -- what  
23    was the interface, were there any interfaces. And he is being  
24    asked about this. And it is obviously a legitimate document  
25    gotten from the State. And I let you put your -- something

1 else that Mr. Barnes developed right in front of me.

2 So I don't know how much longer this is going to go.

3 But is this it?

4 MR. CROSS: Yeah. Just the last email.

5 THE COURT: All right.

6 **Q. (BY MR. CROSS)** Do you see that Mr. Barnes responds, they  
7 can use the USB that the State has previously provided? Do you  
8 see that?

9 **A.** Yes.

10 **Q.** The State's counsel has anticipated where I was going,  
11 which I was going to ask you: As the State elections director,  
12 did you know that this was the advice that was given out to use  
13 USB drives from the old GEMS system with the new system as of  
14 January of this year?

15 MR. RUSSO: Again, Your Honor, I'm going to object.  
16 Mr. Harvey is -- he has not asked Mr. Harvey's email before  
17 unlike the memo document that Mr. Barnes had drafted for  
18 purposes of creating the threshold scanner settings rule.  
19 Mr. Cross is using this document to obtain testimony on the --  
20 on the actual document -- the truth of the document.

21 THE COURT: What he's asking is, did you know about  
22 this? So --

23 MR. RUSSO: Which is in the document.

24 THE COURT: He asked him did he know about this  
25 information. He is allowed to ask about that. Overruled.

1 **Q. (BY MR. CROSS)** Did you know?

2 **A.** I honestly don't know whether I knew or whether I ever saw  
3 this email or this was brought up to me. I don't remember  
4 having a specific conversation about this.

5 MR. CROSS: Ms. Cole, can we bring up number --  
6 Exhibit 40?

7 LAW CLERK COLE: I don't believe I have an  
8 Exhibit 40.

9 MR. CROSS: Oh. All right. We'll skip it and come  
10 back to it. Sorry, Ms. Cole.

11 THE COURT: Are we -- I want to make sure that we  
12 don't have somebody's email on this.

13 MR. CROSS: I think that is Ms. Cole's email. Yep.  
14 That is it.

15 **Q. (BY MR. CROSS)** Mr. Harvey, do you see at the top of  
16 Exhibit 40 there is an email from you to Mr. Tucker and others  
17 on June 9, 2020, the date of the primary election in Georgia?

18 **A.** Yes.

19 **Q.** And I'll ask Ms. Cole if she will just scroll through for  
20 a moment so you can take a look at it.

21 Then just tell me if you recognize this as an email that  
22 you sent.

23 **A.** Although I don't specifically remember, that clearly  
24 appears to be something that I sent.

25 MR. CROSS: If we could just get to the middle of the

1 first page, Ms. Cole. Thank you.

2 **Q. (BY MR. CROSS)** Do you see there is an email from Janine  
3 Eveler, the director of elections for Cobb, on June 9?

4 **A.** I do.

5 **Q.** And because of the BMDs that were happening at this time  
6 in Cobb County, she indicates that they were using paper  
7 ballots.

8 Do you see that?

9 **A.** Yes.

10 **Q.** It is fair to say that the poll workers that were handling  
11 the paper ballots at that time were sufficiently trained to use  
12 those to be marked by hand as backup ballots? You don't doubt  
13 that, do you?

14 **A.** No. From what I gather from this email, I assume they are  
15 issuing them properly.

16 MR. CROSS: Could we get 41, Ms. Cole. Thank you.

17 **Q. (BY MR. CROSS)** Do you see this is an email from Ryan  
18 Germany to you and others again on the date of the primary  
19 election this year?

20 **A.** Yes, I do.

21 **Q.** This one concerns problems at the Cross Keys High School  
22 in Dekalb. Do you see that?

23 **A.** I do.

24 **Q.** And I'm not going to read through the substance of each of  
25 these. But you do see that here there was a problem of a crowd

1 of 100 voters lined up for hours? Do you see that?

2 **A.** I see that is what the newspapers said.

3 **Q.** And -- okay. Never mind.

4 MR. CROSS: 42, Ms. Cole, please.

5 **Q. (BY MR. CROSS)** Do you see this is another email -- you  
6 sent this one again on the election day, June 9? This was  
7 involving machines that were not working at South Atlanta High  
8 School? Do you see that if you scroll down? Six -- only one  
9 of the six machines were working so they had to go to absentee  
10 ballots?

11 **A.** I see that.

12 **Q.** And when the indication here is they went to absentee  
13 ballots, you understand that is actually the emergency backup  
14 ballots by hand at the polls; right?

15 **A.** Correct.

16 MR. CROSS: 44.

17 **Q. (BY MR. CROSS)** Do you see here is another email that you  
18 forwarded on to Mr. Barron and others again on the election  
19 day, June 9? This one is dealing with Fulton County.

20 **A.** I can't read that.

21 **Q.** I'm sorry.

22 **A.** Can we move it a little bit?

23 MR. CROSS: Are you able to zoom in? Yes. Thank  
24 you.

25 THE WITNESS: I'll be able to read that if she

1 scrolls down.

2 MR. CROSS: Ms. Cole has become quite the pro at this  
3 in a hurry. She's going to put our trial graphics people out  
4 of business.

5 **Q. (BY MR. CROSS)** So do you see this one is a complaint that  
6 you forwarded on where a voter had been waiting over three  
7 hours because machines were down? Do you see that?

8 **A.** I do.

9 MR. CROSS: 45. And I only have two more of these.

10 **Q. (BY MR. CROSS)** Do you see at the top this is an email  
11 that you received from Gabriel Sterling on June 9? Again, so  
12 we are still on election day in the primary. Are you with me?

13 **A.** Yes.

14 **Q.** And remind the Court who is Gabriel Sterling.

15 **A.** Gabriel Sterling is the voting system implementation  
16 manager with the Secretary of State's office.

17 **Q.** This one involves machines -- it indicates only half of  
18 the machines were working. This is at Christian City Welcome  
19 Center in Union City, Georgia. Voters had been waiting for six  
20 hours.

21 Do you see that?

22 **A.** I do.

23 **Q.** The last question I have for you on those documents,  
24 Mr. Harvey -- you can see the year on all of those emails. Do  
25 you know why the State did not produce those to us -- why we



1 obtained those from Dominion and not the State?

2 **A.** I have no idea. I wasn't part of any record collection.

3 **Q.** So you have not been involved in any effort to collect  
4 documents for this case?

5 **A.** No. No, sir. I mean, I produced -- I have done  
6 declarations, and I may have given a document here or there.  
7 But as far as a large scale record gathering, no.

8 **Q.** Almost done, Mr. Harvey. You agree that any person in the  
9 State of Georgia who is a legitimate voter can choose to vote  
10 an absentee ballot by paper for any reason or no reason; right?

11 **A.** Yes. An eligible registered voter can do that for any  
12 reason or no reason.

13 COURT REPORTER: I need you to speak up, sir.

14 THE WITNESS: I said, yes, any eligible registered  
15 voter can vote an absentee ballot for any reason or for no  
16 reason.

17 **Q. (BY MR. CROSS)** And there is no limit on the number of  
18 voters in the state that can vote by absentee ballot; right?

19 **A.** That is correct.

20 **Q.** And when we say absentee, we're talking about hand-marked  
21 paper ballots; right?

22 **A.** I assume that is what you mean. Now, we generally  
23 consider in-person advance voting. That is considered absentee  
24 also. But I think I understand you to mean the mail-in ones.

25 **Q.** Right. And, in fact, this year voters are encouraged and

1 expected to use hand-marked paper ballots as absentee ballots  
2 even more than in the past because of the ongoing health  
3 situation; right?

4 **A.** I would agree with that, yes.

5 **Q.** So you are expecting perhaps many more hand-marked paper  
6 ballots to handle this year than in any prior year; right?

7 **A.** Yes.

8 **Q.** And you are not suggesting today that the Court is -- or  
9 that the State is not equipped to handle that; right?

10 **A.** No, I'm not. We have made adjustments and are prepared  
11 to -- we made it easier for people to request absentee ballots  
12 and made it easier for them to get out to folks, provide  
13 equipment so they can tally them when they come in. So --

14 **Q.** And just the last couple of questions. The voters in  
15 Georgia can request an absentee ballot to mark by hand up  
16 until, say, a few days before the election, as long as they get  
17 it returned to the State in time to be counted; right?

18 **A.** Correct.

19 **Q.** So if you had a flood of absentee ballots leading up to  
20 the election, you are not suggesting that the State cannot  
21 handle that? That you wouldn't be able to print those ballots  
22 or get those ballots from voters; right?

23 **A.** I'm not -- that would be -- at that point, that would be a  
24 county responsibility to make sure they got the ballots out if  
25 they got a last minute request. So the county would have to be

1 prepared to deal with the rush at the end.

2 **Q.** You are not suggesting to the Court that the counties  
3 could not do that; right?

4 **A.** No, I'm not suggesting they can't. We have told them to  
5 be prepared for a very heavy turnout in all phases.

6 MR. CROSS: Thank you.

7 MR. RUSSO: Your Honor, I --

8 MR. CROSS: Your Honor, I apologize. I did have one  
9 more document. I'm very sorry. It just didn't relate to the  
10 other subject.

11 Ms. Cole, do you mind pulling up 51?

12 **Q. (BY MR. CROSS)** Mr. Harvey, if you look at the top of this  
13 one -- and I'm not going to walk you through it. But do you  
14 see that this is an email that you received from David  
15 Greenwalt again on June 9, the date of the primary election?

16 **A.** I do.

17 **Q.** I'm sorry. Do you see that?

18 **A.** I do see that, yes.

19 **Q.** And Mr. Greenwalt here is with KNOWiNK; right?

20 **A.** That's correct.

21 **Q.** At the bottom, there is an email where you are writing to  
22 Mr. Greenwalt and you wrote, Poll Pad comments, referencing the  
23 email below, and observations from a pretty good county  
24 elections director.

25 Do you see that?

1     **A.**     I do.

2     **Q.**     Do you recall this email where the county elections  
3     director here identified a number of problems with the Poll  
4     Pads?

5     **A.**     I can see the email. I may remember it. No, I think --  
6     go down so that I can see the first part.

7             I generally remember communicating with her on election  
8     day, and I generally remember this email. Again, I don't know  
9     that I could independently recall everything in it. But yeah,  
10    I believe -- when I sent that note to Ms. Greenwalt, I remember  
11    putting that thing about a pretty good election director.

12            MR. CROSS: Thank you.

13            THE COURT: Could I see the rest of it? I'm sorry.  
14    Could you put it back up, Ms. Cole?

15            All right. Thank you.

16            MR. CROSS: It goes on for a couple of pages, Your  
17    Honor.

18            THE COURT: All right. What number was this?

19            MR. CROSS: 51.

20            THE COURT: And have you introduced it?

21            MR. CROSS: Yeah. I move into admission all of the  
22    exhibits that I just used, Your Honor.

23            THE COURT: Are there objections? I know that -- the  
24    objection is noted as to the ones that were presented to the  
25    witness that he was not copied on. I don't know which numbers

1 those were.

2 MR. CROSS: That was Exhibit 37.

3 MR. RUSSO: What were the exhibit numbers, David?

4 I still have that objection, of course. But the  
5 others, no objection.

6 MR. CROSS: Thank you.

7 MR. RUSSO: What were those exhibit numbers?

8 MR. CROSS: Let me pull them up.

9 MR. RUSSO: I'll reference them on redirect.

10 MR. CROSS: It is Exhibit 40, 41, 42, 44, 45. And I  
11 think 51 is the last one.

12 MR. RUSSO: Okay.

13 MR. CROSS: He is your witness, Mr. Russo.

14 THE COURT: I note the objection. I'm going to admit  
15 all the documents. I don't want to have -- at this point have  
16 the plaintiffs have to subpoena Mr. Barnes to identify a  
17 document that seems to be associated with the elections also.  
18 So if defendants want to address it in some other manner, that  
19 is fine.

20 MR. RUSSO: Thank you, Your Honor.

21 REDIRECT EXAMINATION

22 BY MR. RUSSO:

23 Q. Mr. Harvey, I just have a couple of quick points to follow  
24 up on. I will first --

25 MR. RUSSO: And, Ms. Cole, if you could, please bring

1 up Exhibit 40, I believe. It is the first one. Can you scroll  
2 up, please? No, that is not the document.

3 David, what was the first document you put up?

4 MR. CROSS: The first one was Exhibit 37, the Michael  
5 Barnes one that you objected to.

6 MR. RUSSO: Okay. Yes. That is what I was looking  
7 for.

8 **Q. (BY MR. RUSSO)** Thank you. Mr. Harvey, I know that you  
9 are not on this email. But the email states that they can use  
10 the USB that the State has previously provided.

11 Now, do you know whether Mr. Barnes was referring to a USB  
12 from the old election system or just one that had been  
13 previously provided to the point of this email?

14 **A.** I don't know.

15 **Q.** Thank you.

16 MR. RUSSO: And that is enough for that document.  
17 Thank you, Ms. Cole.

18 I believe the next one would be Exhibit 40. Could  
19 you scroll down, please.

20 That's fine. You can -- this is going to be too  
21 difficult of a process, I think. I can get through asking  
22 Mr. Harvey the question.

23 This is fine. Sure.

24 **Q. (BY MR. RUSSO)** Mr. Harvey, when the State receives a  
25 complaint that goes into the complaint inbox, what is the

1 complaint inbox?

2 **A.** The complaint inbox is an inbox that if somebody wants to  
3 file a complaint from our web page or any comment or anything  
4 like that they click on that link and it takes them to a form  
5 where they complete the information that you see there, their  
6 name, their telephone, email, county, nature of call, et  
7 cetera. And that comes to an inbox that is monitored by the  
8 elections division.

9 **Q.** Okay. Now, this email here is -- does not appear to be  
10 the complaint inbox; is that right?

11 **A.** Correct. This is from -- directly from the call center.

12 MR. RUSSO: Okay. And you can put that one down.

13 I think that is all, Your Honor, I have on redirect.

14 THE COURT: I have a question or two. Holly, could  
15 you put me back or can I -- the video back? I had taken myself  
16 off. Thank you.

17 EXAMINATION

18 BY THE COURT:

19 **Q.** Your declaration is at Document 815-1 attached to the  
20 State's response to the Coalition's motion. And I would be  
21 most appreciative if you could provide some clarification about  
22 the differences between the electors list and the supplemental  
23 list that the Secretary of State's office and the counties are  
24 providing each precinct after early voting and the version, on  
25 the other hand, of the backup list that the plaintiffs in this

1 case are requesting to be delivered on the weekend that we  
2 discussed.

3 **A.** Okay. I didn't catch the second part of the question,  
4 Your Honor. I get the difference between the elector list and  
5 the supplemental list.

6 What was the second part of the question?

7 **Q.** I understand you have got an electors list and then you  
8 have a supplemental list. And I need to make sure I understand  
9 what is in the supplemental list.

10 But in tandem -- you know, you have got those lists. But  
11 what the plaintiffs are asking for is that the actual --  
12 basically an up-to-date list that can be used for verifying  
13 voters when they appear be provided to the polling places on  
14 essentially the weekend before voting starts so that they can  
15 not be spending time calling the office trying to verify voter  
16 status, that they can resolve their status and they can also  
17 potentially, if necessary, because of problems with any of the  
18 machinery -- the failure and backup of lines that they can  
19 issue emergency ballots and people won't just give up and go  
20 away.

21 **A.** Okay. I'll try my best. I know I can handle the first  
22 part, but I'll try my best on the second part. The electors  
23 list is the list of all the registered voters in a county.

24 The list for the -- that is -- as I mentioned, that is  
25 created early in the process, near the time of the voter



1 registration deadline.

2 What happens on the second Thursday before the election is  
3 that CES pulls the list of -- the voter list for each county.  
4 So if we are sticking in Fulton County, on the second Thursday  
5 before election day, they would pull from our voter  
6 registration system every registered voter in Fulton County.  
7 And they would then put that on the Poll Pads for election day.  
8 So you would have all the registered voters that are in the  
9 database then.

10 The problem is that in some of the large counties they get  
11 so many voter registration applications they are not always  
12 done entering them into the system by that point. So the  
13 supplemental list is everybody that is entered into the voter  
14 registration system. Now, their application has been received  
15 by the deadline. But that is everybody that gets entered into  
16 the election net system between the original pull for the Poll  
17 Pads and election day.

18 And so that is done on Saturday after the end of the  
19 advance voting. So if a county has -- and the electors list is  
20 really for a backup for safety. So what happens is when you  
21 have got a Poll Pad, you have got everybody in that county that  
22 was in the voter registration system as of the second Thursday  
23 before. But if you were one of the last people to get entered  
24 in, you are not going to be on the Poll Pad.

25 So if you come in to vote and they can't find you on the

1 Poll Pad, the first thing they should do is check the  
2 supplemental list. Because if you were one of the last ones to  
3 be entered, you are going to be on the supplemental list. They  
4 mark you on the supplemental list, and they create a card for  
5 you, and you vote on the BMD. So that is the difference  
6 between the electors list and the supplemental list.

7 The electors list would be --

8 **Q.** When is the supplemental list provided? I'm sorry.

9 **A.** The supplemental list is -- again, the second Thursday  
10 before the election, they pull the list of voters for the  
11 county. The problem is that in some counties the voters keep  
12 getting added to the voter registration system.

13 And if you -- you don't want to stop rendering -- stop  
14 entering voters just because the data has been pulled. So what  
15 you do is you -- you wait until that Saturday before or that  
16 Friday and then you say, okay, give me everyone in the voter  
17 registration system that we added since we did the main pull.  
18 And you can't update them into the Poll Pads. So you create a  
19 second list of them.

20 The smaller the supplemental list the better. Because  
21 that means the smaller your supplemental the more voters that  
22 are in the Poll Pads. The larger the supplemental list means  
23 you were late getting voters entered into the voter  
24 registration system.

25 **Q.** So according to your affidavit, which Ms. Cole has very

1 kindly pulled up for me, that supplemental list is generated in  
2 eNet and you are expecting the county to print that if they  
3 want to --

4 **A.** They have to. We basically order it in eNet, and then the  
5 county can pull it and print it on that weekend before the  
6 election.

7 **Q.** So once they print that, assuming that it is actually  
8 accurate, is it your representation that basically -- that  
9 between the voter's list that they have and this supplemental  
10 list they have a complete list of everyone who is in their --  
11 properly registered in the precinct?

12 **A.** Yes, ma'am.

13 **Q.** But what they don't have then is information as to whether  
14 they have cast a ballot or not?

15 **A.** Correct.

16 **Q.** So why -- the plaintiffs have a provided their declaration  
17 in the exhibits -- a number of different ones that indicate  
18 that counties are using their basic list of voters, for  
19 instance, the August 11 runoff had been run in June for the  
20 June 9 primary.

21 So basically either they have a massive supplemental or  
22 else they really -- if they don't end up -- they don't have  
23 really an up-to-date voter registration list of voters.

24 Is there any reason that you can think of that the  
25 county -- the State would be providing the counties or the

1 precincts with basically data voter registration information?

2 **A.** Well, it is -- they have the Poll Pad, which is the  
3 complete list. And then they would have a new supplemental  
4 list for the runoff. So on August 11, they would get a new  
5 supplemental list. And they would have the Poll Pad that would  
6 have the up-to-date list. You are saying we run a second --

7 **Q.** I see. For the August runoff, you wouldn't have run  
8 anything extra? You would have just had the June -- whatever  
9 it was as of June?

10 **A.** I believe that is correct.

11 **Q.** Were you present during the last witness from Fulton  
12 County -- his testimony?

13 **A.** I saw most of it. There were some times where I had to  
14 step away, but I saw most of his testimony.

15 **Q.** Do you recall -- I think you have attended almost every  
16 hearing. Though I'm not positive of that. I have repeatedly  
17 asked what -- in going back to December, why is it that we  
18 still -- the State is reluctant to -- I realize it is a burden.  
19 But it could -- especially as you are transitioning to an  
20 entire new data system that may at minimum have kinks in it,  
21 why is it you are not willing to provide the precincts and  
22 counties with an up-to-date list of voters and whether --  
23 basically whether they have cast votes?

24 **A.** Well, Your Honor, we do that. That is the ExpressPolls.  
25 That is the Poll Pads.

1 Q. Right. I know it is the Poll Pad. But as I'm sure you  
2 recognize, there were significant issues with the electronic  
3 Poll Pads.

4 So basically what are you leaving -- basically voting  
5 locations in Fulton County and other -- many other places, what  
6 is the position you are putting them in if they have a  
7 significant breakdown in the functionality of the Poll Pads?

8 A. Well, they do have a paper list.

9 Q. No. What they have is -- they have a paper list, and then  
10 they can call you multiple times -- the office and stay on the  
11 phone. But then people -- the longer the lines are the more  
12 people are likely to leave. So I mean, I know you are familiar  
13 with that phenomenon.

14 A. Yes, ma'am. And to clarify, they don't call our office.  
15 They call each county office to find out if an absentee ballot  
16 has been entered.

17 I'm not sure how logistically possible it is to do what  
18 you are asking. If there was a way that it could be provided  
19 and -- it would have to be some of the counties would have to  
20 print out. If we could provide it digitally, it would have to  
21 be something counties could print out. There is no way we  
22 could print it on that Saturday before the election and get it  
23 to the counties -- get it to 159 counties. That is  
24 logistically impossible.

25 Q. But, Mr. Harvey, is it, in fact -- isn't it possible for

1 you to at least be able to provide that data and that report to  
2 the counties so they could at least choose to run this and have  
3 the option meaningfully of allowing people to use the emergency  
4 ballots and move their lines quicker so people don't give up?

5 **A.** Your Honor, not being an expert on every phase of eNet, if  
6 that is possible to create that report, I would have no  
7 objection to making that available to the counties to do with  
8 it what they wanted. I'm not 100 percent sure if that is a  
9 report that is available.

10 **Q.** Who would know that?

11 **A.** Our systems manager. I could certainly get that through  
12 our attorneys and get back to the Court probably within a day  
13 or so.

14 **Q.** Because I think this is what I've been asking for for some  
15 time and just basically have not gotten an answer for months  
16 dating back to other hearings. But I think it would be  
17 important to know.

18 **A.** Yes, ma'am. I'll get you that answer.

19 **Q.** Finally, on the -- thank you very much.

20 And on the emergency ballot, this is not a provisional  
21 ballot, is it? When you do an emergency ballot and you have  
22 been verified as a voter, then it is going to be scanned in  
23 like any other ballot; is that correct?

24 **A.** That's correct. Although physically it is the same as a  
25 provisional ballot. The difference is with provisional you put

1 it in an envelope and with an emergency you put it directly  
2 into the scanner.

3 **Q.** All right. Very good. Thank you.

4 So the individual -- the individual voter leaves knowing  
5 that he or she has actually cast a ballot?

6 **A.** Yes. They place it themselves in the scanner.

7 THE COURT: Right. Thank you.

8 MR. RUSSO: Your Honor, could I ask Mr. Harvey one  
9 point of clarification?

10 THE COURT: Yes.

11 MR. RUSSO: I think it might clear up some of the  
12 questions also.

13 REDIRECT EXAMINATION (Further)

14 BY MR. RUSSO:

15 **Q.** Mr. Harvey, when absentee ballots are coming in or going  
16 into the counties, can you explain to us the process of the  
17 county accepting the absentee ballot and then updating the  
18 information in eNet, which is ultimately what is in the  
19 electors list?

20 **A.** Every time the county receives an absentee ballot back in  
21 from a voter, they have to make sure that it is -- the  
22 signatures are present, the signature matches. And then they  
23 enter it in eNet as whether it as accepted or rejected and the  
24 date that it is accepted or rejected.

25 So if it is -- if the ballot comes back and the signature

1 is compared favorably and it is accepted, they would mark it as  
2 an accepted ballot on this date and they would put the ballot  
3 in a container to be scanned during either early scan or  
4 election day.

5 If it was rejected, it would show that it was rejected for  
6 this reason on a certain date and then the county would have to  
7 provide a cure affidavit to contact the voter and let them know  
8 how they could cure their absentee ballot.

9 The updating in eNet is what voters are able to see when  
10 they check their -- if they go to MVP, for example, and check  
11 the status of their ballot, if their ballot has been received  
12 and accepted back by the county, they will see it on MVP. They  
13 will only see it on MVP if the Court inputs it into eNet in a  
14 timely manner.

15 **Q.** And absentee ballots, sir, are presumably coming in all  
16 the way up through the date of the election; right?

17 **A.** Up until the close of polls. So they are coming into the  
18 office -- usually the last -- most post offices arrange a  
19 special run at about 6:00 or 7:00 to get to the counties.

20 **Q.** So if somebody -- a voter mails in an absentee ballot  
21 before it is -- and they look on -- on MVP and they show that  
22 the ballot has not been accepted, until that ballot is  
23 accepted, the electors list or eNet will not show whether the  
24 ballot has -- you couldn't update a paper pollbook or paper  
25 electors list to show that somebody's absentee ballot had come



1 in unless it had actually been accepted by that point by the  
2 time that it had been printed?

3 **A.** Right. It would only show accepted ballots that were  
4 accepted in eNet. It wouldn't show the 500 that are still  
5 waiting to be sorted.

6 MR. RUSSO: Okay. I don't know if that helps clear  
7 up some of the timing issue of when paper ballots are coming in  
8 versus what the paper pollbook or paper electors list shows,  
9 Your Honor.

10 THE COURT: Well, obviously, you know, if you come in  
11 if you want to vote and you ask for a ballot -- absentee ballot  
12 and you don't have it, you get -- there is obviously  
13 something -- a process that occurs at that time. And typically  
14 you are supposed to bring -- as you all know very well, you are  
15 supposed to bring back the ballot if you want to now vote. And  
16 there would be a protocol for any precinct poll workers to say,  
17 no, you still have a ballot out there. I can't do that.

18 But I'm really talking about right now in large part  
19 the problem of a line and people who cannot -- particularly in  
20 this era, not be able to be standing in a line with a lot of  
21 people waiting to vote and having that as an impediment to  
22 their casting a vote when there is, in fact, an emergency  
23 process and when you, in fact, have a documented record of some  
24 significant problems with the pollbooks. It just seems like a  
25 reasonable way of thinking about something concrete to do.

1 I'm taking in all that you are saying. I'm just  
2 asking about it so that I can actually have -- you know,  
3 Mr. Harvey is head of elections. I realize he is not  
4 Mr. Barnes. But I'm sure you will have other people.

5 I'll be asking -- I'm asking counsel. I have asked  
6 counsel about this before. Basically I indicated, you know, in  
7 our conversations before it was something I was going to be  
8 asking about.

9 All right. Thank you very much, Mr. Harvey. I  
10 appreciate your being here. Good luck on election day.

11 THE WITNESS: Thank you.

12 THE COURT: Anyone need a break for a few minutes?  
13 Okay. We will take five minutes and resume. It is 2:53.

14 COURT REPORTER: How long did you say, Judge? I  
15 couldn't hear you.

16 THE COURT: Five minutes. Is that sufficient?

17 COURT REPORTER: Sure.

18 **(A brief break was taken at 2:53 P.M.)**

19 THE COURT: I just wanted to finish up what I last  
20 said, which is also that I do recognize that it is not  
21 necessarily all the Poll Pads, that there were other document  
22 issues relating to BMDs and this is a transitional period of  
23 time. But the comment holds.

24 All right. Mr. Cobb, he is the State's witness?

25 MR. TYSON: Yes, Your Honor. We call Jack Cobb as

1 our next witness.

2 THE COURT: Great.

3 MR. TYSON: Do you want to swear Mr. Cobb?

4 THE COURT: Would you raise your right hand,  
5 Mr. Cobb.

6 **(Witness sworn)**

7 THE COURT: And where are you located at this time,  
8 Mr. Cobb?

9 THE WITNESS: I am in my office in Huntsville,  
10 Alabama.

11 THE COURT: Thank you very much.

12 Whereupon,

13 JACK COBB,

14 after having been first duly sworn, testified as follows:

15 DIRECT EXAMINATION

16 BY MR. TYSON:

17 **Q.** Thank you, Mr. Cobb. Good to see you. Thank you for  
18 joining us via Zoom.

19 Very briefly if you could summarize your experience and  
20 what Pro V&V is.

21 **A.** I have been a software systems test analyst or engineer  
22 for 14 years in the voting systems arena. I cofounded Pro V&V,  
23 which is an accredited national institute and a standards and  
24 technology accredited lab and a United States Election  
25 Assistance Commission accredited VSTL or voting systems test

1 laboratory.

2 **Q.** Thank you. And what does Pro V&V do specifically with  
3 election equipment?

4 **A.** We test electronic equipment to the voting -- Voluntary  
5 Voting Systems guidelines and the VSS, which is the Voting  
6 Systems Standards. We work for the -- under the EAC  
7 supervision to test electronic voting equipment.

8 **Q.** And can you briefly summarize what the voluntary voting  
9 system guidelines are?

10 **A.** They are a published document by the United States  
11 Election Assistance Commission that contains roughly 1500  
12 requirements. For a voting system to be certified by the  
13 Election Assistance Commission, you have to pass those  
14 standards.

15 **Q.** And I know there was some testimony earlier about VVSG 1.0  
16 versus 1.1 versus 2.0.

17 Can you briefly explain what the differences in those  
18 numbers refer to?

19 **A.** Yes. The version 1.0 is the 2005 standard. And the 1.1  
20 were adopted when they got commissioners in, I believe, the  
21 February 2015 time frame. And then the 2.0 is currently under  
22 adoption. We're working on the test assertions to go along  
23 with the requirements so that it can fully be adopted and can  
24 be tested to.

25 **Q.** Are there a number of voting systems currently certified

1 under VVSG 1.1?

2 **A.** No, sir. There are none.

3 **Q.** So there is no hand-marked paper ballot system that is  
4 certified under VVSG 1.1?

5 **A.** No.

6 **Q.** There has been some discussion earlier about the  
7 difference in Dominion's 5.5 system and its 5.5-A system.

8 Have you heard that testimony?

9 **A.** Yes.

10 **Q.** And you talk in your declaration about something referred  
11 to as a FIPS, I believe, F-I-P-S. Is that a difference in  
12 those systems, or have you done more research on this issue?

13 **A.** No. I have done more research on this issue. The  
14 difference in the 5.5 and 5.5-A is what is called the  
15 Pennsylvania Rule for Straight Party Voting. And their system  
16 had -- when they presented their system to the common laws of  
17 Pennsylvania, it did not perform that correctly. And that is  
18 the difference in 5.5 and 5.5-A.

19 **Q.** And is there any difference in a Dominion system that  
20 involves a five series that involves a FIPS?

21 **A.** Yes. The 5.0-A that went through the EAC under my lab is  
22 the one with the FIPS. And that is where the confusion came  
23 in. I was trying -- I rushed through to get my declaration  
24 out, and I did not do the research to ensure of what the exact  
25 changes were. And when I heard Dr. Coomer talk, I went back

1 and looked it up just to make sure.

2 **Q.** Okay. And is there any difference between the 5.5-A and  
3 the 5.5-A (GA) systems?

4 **A.** That report was designated as GA because the Election  
5 Assistance Commission will not allow a state level report that  
6 we performed specifically for states to go out before the  
7 federal certified systems report goes out. So they make us put  
8 a designation on it so they will know that that is just for  
9 Georgia and it is not the stuff that the EAC is working on.

10 **Q.** And so is there a difference between those two systems, or  
11 are they the same?

12 **A.** They are the same.

13 **Q.** Has Dominion's 5.5 or 5.5-A been the subject of security  
14 testing?

15 **A.** Yes. I'm aware of two or three, one in the EAC world and  
16 one in the Commonwealth of Pennsylvania.

17 **Q.** And did Pro V&V conduct any security testing of either 5.5  
18 or 5.5-A?

19 **A.** We conducted 5.5 but not 5.5-A.

20 **Q.** And did a different voting system test lab perform  
21 security testing on 5.5-A?

22 **A.** Yes. SLI Compliance did the 5.5-A.

23 **Q.** Now, you have read Dr. Halderman's criticism of you for  
24 using the term encrypted for the QR codes; correct?

25 **A.** Correct.

1 Q. And can you explain to the Court your version of the  
2 varying terminology here?

3 A. The words that I used were a direct quote from a document  
4 that was provided by Dominion. Now, what the real technical  
5 terms should mean is that they are authenticated and it is  
6 encoded. I think Dr. Coomer talked about the bitmask and all  
7 that stuff.

8 So there was no -- there is no algorithm which would be  
9 encryption or cryptographic modules that encrypt the barcode or  
10 the QR code. But the QR code is not in human readable format  
11 because it is encoded.

12 Q. And you have also done testing on KNOWiNK Poll Pads; is  
13 that correct?

14 A. Correct.

15 Q. Do you know if Poll Pads are used in a lot of the  
16 jurisdictions across the country?

17 A. They are. And, specifically, the KNOWiNK Poll Pad, I  
18 believe, is in over 20 states and Canada, I think.

19 Q. And there has been some testimony in this case that the  
20 KNOWiNK Poll Pads can generate an unlimited number of voter  
21 access cards.

22 Have you heard that testimony or read those declarations?

23 A. I read the declarations. I don't remember any testimony.  
24 But, specifically, yes, they can create activation code cards  
25 for a voter. If a voter doesn't vote and then says that is not

1 who I voted for, they can return that ballot to the poll  
2 worker, the poll worker can spoil the ballot, they can receive  
3 another card and go vote.

4 It is not that they can get multiple cards. The process  
5 is they can't get multiple cards at the same time. But a voter  
6 could end up having three or four and in I think some  
7 jurisdictions limit it to you can spoil about three, five  
8 times. It is jurisdiction-specific.

9 **Q.** So is it a usual setup to have the KNOWiNK Poll Pad able  
10 to create multiple voter cards?

11 **A.** Yes.

12 MR. TYSON: All right. Your Honor, in the interest  
13 of efficiency, that is all the questions I have for Mr. Cobb.  
14 And I'm sure the plaintiffs will have some questions to ask.

15 MR. CROSS: Thank you, Your Honor.

16 CROSS-EXAMINATION

17 BY MR. CROSS:

18 **Q.** Hi, Mr. Cobb. I'm David Cross, and I represent the  
19 Curling plaintiffs.

20 **A.** Good afternoon.

21 **Q.** Can you hear me okay?

22 **A.** Yes, sir.

23 **Q.** When were you retained by the State as a consultant for  
24 the Georgia election system?

25 **A.** Can you be more specific? For this specific one or --



1 because I was retained under the old GEMS stuff as well.

2 **Q.** So when were you first retained?

3 **A.** I can't say for certain. I can give you an approximate  
4 time frame of 2012.

5 **Q.** You and your firm had not performed any penetration or  
6 security testing on Georgia's Dominion voting system; right?

7 **A.** We have not on the 5.5-A.

8 **Q.** Which is the system used in Georgia; correct?

9 **A.** Correct.

10 **Q.** And did you ever perform any penetration or security  
11 testing on the prior GEMS system for Georgia?

12 **A.** No.

13 **Q.** No. Okay. Did you write your declarations yourself?

14 **A.** Yes.

15 **Q.** In your August 25th declaration, which we have marked as  
16 Exhibit 28 -- and we can pull it up if you need it -- but you  
17 write in that, in the case Donna Curling, et al. vs. Brad  
18 Raffensperger, the plaintiffs assert claims that are simply not  
19 true.

20 Did you write that?

21 **A.** Yes.

22 **Q.** So let's talk through those. You identify in that  
23 declaration specific claims from Dr. Halderman which you say  
24 were not accurate. Let's turn to the first one.

25 The first one you identified -- and this is Paragraph 7 of

1 your original declaration -- is that the voting system software  
2 can be altered in a way that cannot be detected, that the claim  
3 from Dr. Halderman you said was false.

4 Do you remember that?

5 **A.** Yes. Can I get the document up --

6 **Q.** Sure.

7 **A.** -- just for clarification?

8 MR. CROSS: Ms. Cole, it is Exhibit 28. We're at  
9 Paragraph 7.

10 LAW CLERK COLE: Do you know what page that is on?

11 MR. TYSON: Page 5, Ms. Cole.

12 MR. CROSS: Thank you.

13 THE COURT: This is document -- would you cite the  
14 document number again. I'm sorry.

15 MR. CROSS: It is Exhibit Number 28. It was filed on  
16 the docket as 821-6.

17 THE COURT: Thank you.

18 **Q. (BY MR. CROSS)** So, Mr. Cobb, if you look at Paragraph 7,  
19 you see in the second sentence where it says, I have reviewed  
20 the declaration of Alex Halderman.

21 Do you see that?

22 **A.** Yes.

23 **Q.** And you say, which claims that the voting system software  
24 can be altered in a way that cannot be detected. Right?

25 **A.** Correct.

1 Q. And that is one of the claims that you say was simply not  
2 true; right?

3 A. Correct.

4 Q. And your response to that, as you go on, is to say, the  
5 voting system actually has a built-in feature that will  
6 generate a SHA-256 hash value at any point before and during  
7 voting to allow for easy checks to determine if it matches with  
8 Georgia's version.

9 A. Correct.

10 Q. Do you see that?

11 A. Yes, sir.

12 Q. So you understand that both Dr. Halderman and Mr. Liu have  
13 explained that malware that gets into the system -- it gets  
14 into the BMDs and the other equipment can trick the system so  
15 that it generates whatever hash value it needs to conceal the  
16 fact that there is malware? You understand that; right?

17 A. Well, I understand that that is their claim. The  
18 specifics of why I made my claim the way it is is because there  
19 is a single APK file that resides on the device -- just one.  
20 And it gets hashed when you push this icon.

21 So the other codes, the other applications, everything  
22 else that is running, a malware, for instance, it can't  
23 generate that code.

24 Q. I'm sorry. Mr. Cobb, is it your testimony that the  
25 Georgia BMD system if you ran this SHA-256 test there is no

1 malware that could trick that test?

2 **A.** That is not my testimony, no.

3 **Q.** Okay. I'm sorry. What were you saying then? I  
4 misunderstood.

5 **A.** On a technical level, the software is an APK file, a  
6 single file. It is produced with -- it has a hash value that  
7 can be produced for the APK file. If you alter that APK file,  
8 the SHA-256 will change.

9 **Q.** But the malware --

10 **A.** I'm talking about malware or anything else on the system.  
11 The specific software of the voting system, which would be the  
12 APK. If the malware generated a different APK, it is going to  
13 generate a different hash value.

14 **Q.** Right. So the APK generates the hash value; right?

15 **A.** The application itself has a built-in ability to hash  
16 itself.

17 **Q.** Right. And malware can defeat that? We're agreed on  
18 that? That is doable; right?

19 **A.** I'm not aware of that.

20 **Q.** You have not tested for that, have you, sir?

21 **A.** No.

22 **Q.** In fact, in your supplemental declaration where you  
23 respond to Dr. Halderman and Mr. Liu, you don't talk about hash  
24 values again, do you, sir? You don't mention hash values?

25 **A.** I was responding to their response. No, I didn't.

1 Q. Now, the next claim that you said from plaintiffs and  
2 Dr. Halderman was simply not true --

3 MR. CROSS: If you go to Paragraph 10. If we can get  
4 Exhibit 28, again, Ms. Cole -- it is Paragraph 10, which I  
5 think it is going to be the next page or close.

6 Q. (BY MR. CROSS) So here you say in Paragraph 10 the next  
7 claim that we're addressing, for example, the declaration --  
8 this is Dr. Halderman's declaration you are referring to --  
9 also stated that attackers could potentially infect Georgia's  
10 BMDs with malware in several ways, including spreading it from  
11 the election management system. In this system, the election  
12 files, including the QR codes, are digitally signed and  
13 encrypted.

14 Do you see that?

15 A. Yes.

16 Q. And you go on to say that Dr. Halderman is wrong about  
17 this attack in Georgia because -- these are your words -- if a  
18 QR code was somehow manipulated on the BMD, which I have never  
19 seen occur in any context using the Dominion system, the  
20 digital signature would also be altered and would not be  
21 accepted by the scanner.

22 Do you see that?

23 A. Yes.

24 Q. So we're all agreed that the QR codes are not encrypted?

25 A. Agreed.

1 Q. And the statement that I just read about the QR code if  
2 the QR code was somehow manipulated and you go on the digital  
3 signature would also be altered, it would not be accepted by  
4 the scanner -- you know that statement is not correct; right?

5 A. Can you repeat -- can you rephrase that?

6 Q. When you say that if the QR code was somehow manipulated  
7 the digital signature would also be altered and it would not be  
8 accepted by the scanner, do you stand by that?

9 A. In the -- in the 5.5 system, we tried altering the QR  
10 code, not 5.5-A. But in 5.5.

11 Q. So you haven't even tested this on the system in Georgia?

12 A. No.

13 Q. Now, you are aware that Dr. Halderman has succeeded at  
14 doing this with election equipment used in Georgia altering the  
15 QR code and having it scanned and tabulated?

16 (Unintelligible cross-talk)

17 MR. TYSON: -- and, Your Honor, characterizing  
18 testimony that is from a confidential source. We have not --  
19 we have been over this. This is subject to the protective  
20 order.

21 MR. CROSS: This is --

22 THE COURT: Strike that from the record.

23 Q. (BY MR. CROSS) Let's turn to the next claim. You say  
24 that Dr. Halderman if you turn to -- I'm sorry. If we can go  
25 to Paragraph 12. Here we are.

1           You write that another erroneous claim in Dr. Halderman's  
2       declaration that focuses on paper ballots is hand-marked paper  
3       ballots are already used in Georgia for absentee voting and so  
4       they are prepared and printed for every ballot style in every  
5       election.

6           Do you see that?

7       **A.**    Yes, sir.

8       **Q.**    But you understand that Georgia is required to prepare and  
9       print every ballot style in every election for marking by hand  
10      as absentee ballots or emergency ballots; right?

11      **A.**    I think I heard testimony that they print ten percent,  
12      yes.

13      **Q.**    And so Dr. Halderman's statement is accurate; right?

14      **A.**    I said -- can you go -- sure, they print every ballot  
15      style.

16      **Q.**    You mention that election printers in the U.S. are  
17      backlogged. But you don't identify any printer specific  
18      company that is backlogged, do you, sir?

19      **A.**    No.

20      **Q.**    And you don't indicate that you have spoken to any printer  
21      about their ability to handle hand-marked paper ballots in a  
22      large volume in Georgia; right, sir?

23      **A.**    No.

24      **Q.**    I'm sorry. Did you say no?

25      **A.**    I said no.

1 Q. Thank you.

2 Let's look at your supplemental declaration, which is  
3 Exhibit 29, Ms. Cole. If we can go to Paragraph 13.

4 LAW CLERK COLE: Do you know what page that is on?

5 MR. CROSS: Yeah. Sorry. I should have used page  
6 numbers. Page --

7 MR. TYSON: Page 4.

8 MR. CROSS: Yeah. It is Page 5 of the PDF, Page 4 of  
9 the declaration. Thanks, Bryan.

10 Q. (BY MR. CROSS) Here you wrote, regarding QR code  
11 security, Mr. Liu claims -- I guess that is a typo in the  
12 paragraph -- but you say that malware running on a BMD will  
13 have full access to the necessary material to generate a  
14 fraudulent QR code.

15 Do you see that?

16 A. Uh-huh (affirmative).

17 Q. Yes?

18 A. Yes.

19 Q. Is it true -- do I understand correctly that once the BMD  
20 in Georgia is used in an election, once it is operating in an  
21 election, at that point there is no dispute that it will have  
22 all the keys it needs to generate a fraudulent QR code,  
23 assuming that that is possible; right?

24 A. Can you rephrase that?

25 Q. Right. So we're talking about a situation where a BMD is



1 in use in an election in Georgia; right?

2 **A.** Yes.

3 **Q.** So at that point for it to be used, that means that the  
4 election workers had to load the keys to it that you are  
5 talking about in Paragraphs 13 and 14 so that it can function;  
6 right?

7 **A.** They are there, yes.

8 **Q.** They are there on the BMD; right?

9 **A.** Yes. They are wrapped up in the APK.

10 **Q.** Okay. So at the point that an election is ongoing,  
11 whatever keys would be needed for malware to generate a fake QR  
12 code is sitting on the BMD; right?

13 MR. TYSON: Your Honor, I'll object. This is  
14 assuming facts that I don't think are in evidence anywhere. I  
15 don't know that there's a foundation for malware that can  
16 create a fraudulent QR code.

17 MR. CROSS: Well, because I'm not allowed to mention  
18 it. I mean, that is the difficulty here. We all know what --

19 THE COURT: Okay. Just -- you can pursue the  
20 question.

21 MR. CROSS: Thank you, Your Honor.

22 **Q. (BY MR. CROSS)** Did you understand --

23 THE COURT: The witness has tested this -- the  
24 equipment, is familiar with the equipment, and represents he  
25 is. And certainly that is the representation of the State. I

1 think it is a fair question.

2 **Q. (BY MR. CROSS)** Do you need the question again, Mr. Cobb?

3 **A.** Yes, I do, please.

4 **Q.** Okay. So at the time when the BMD in Georgia is in use,  
5 it is in an election, at that point it has whatever keys would  
6 be needed loaded on it to generate a fake QR code?

7 **A.** Yeah. The keys would be on the device.

8 MR. CROSS: Ms. Cole, if we could go to -- let me get  
9 you a page number -- Page 7 still in Exhibit 29. I'm sorry.  
10 Go to Page 8. My apologies. I was looking at the wrong  
11 pagination. Thank you.

12 **Q. (BY MR. CROSS)** So if you look at Paragraph 20 here,  
13 Mr. Cobb, here we're talking about whether the QR codes are  
14 encrypted or encoded.

15 Do you see that?

16 **A.** Yes, sir.

17 **Q.** And you explain here that your earlier statements that the  
18 QR codes have digital signing and encrypting come directly from  
19 a document that you obtained from Dominion that is an overview  
20 on the system that we're talking about here; right?

21 **A.** Correct.

22 **Q.** And you quoted here to say, the encoded data is encrypted  
23 and signed in order to prevent tampering, abuser selection, and  
24 eliminate possibility of error during ballot scanning process.

25 Do you see that?

1     **A.**     Yes.

2     **Q.**     Do I understand correctly that for your representations to  
3     the Court in your earlier declaration that the QR codes were  
4     encrypted you were relying on information from Dominion?

5     **A.**     Yes, sir. That document.

6     **Q.**     So in all of the testing that you have done with this  
7     system, all the time you spent with it, you never figured out  
8     on your own that the QR code was not encrypted?

9     **A.**     I don't do the security testing specifically. Jack Cobb  
10    doesn't do the security testing specifically. This specific  
11    one would have been done by Rebecca Santos, and she is our  
12    security expert -- was our security expert at that time. She  
13    had -- she is no longer with us. So I didn't have her to go  
14    ask.

15    **Q.**     Just so we're clear, I mean, you made a big point in the  
16    sworn declaration to the Court about encryption. But the only  
17    thing you were relying on for that was this overview from  
18    Dominion rather than your own testing; right?

19    **A.**     Yes.

20               THE COURT: Can I get some clarification? Was  
21    Ms. Santos with you at that time and she did testing or --

22               THE WITNESS: Yes, ma'am.

23               THE COURT: And have you reached out to Ms. Santos?

24               THE WITNESS: No.

25               THE COURT: No. And when did she leave?

1 THE WITNESS: November 2018.

2 Q. (BY MR. CROSS) So she left almost two years before you  
3 submitted your declaration to the Court saying that the QR code  
4 was encrypted; right?

5 A. Yes.

6 Q. And we certainly all agree that there is a fundamental  
7 computer science and security distinction between coding data  
8 and encrypting data; right?

9 A. Yes.

10 Q. Are you aware that the QR codes on -- from the Dominion  
11 system -- the BMD system can be decoded with a simple iPhone  
12 app so you can see what the voter selections are?

13 A. I am not aware of that.

14 Q. You have never tried that? That is not something you  
15 tested?

16 A. Specifically, I have not.

17 Q. In your testing, did you ever take a test ballot,  
18 photocopy it on regular paper, run it through a scanner, and  
19 see if it would tabulate?

20 A. Yes.

21 Q. Did it work?

22 A. Yes.

23 Q. Meaning did it tabulate?

24 A. Yes.

25 Q. Okay. So you are aware that that happens with the system

1 that is used in Georgia; right?

2 **A.** Yes.

3 MR. CROSS: Those are all the questions I have at  
4 this time, Your Honor.

5 MR. MCGUIRE: Your Honor, may I?

6 THE COURT: Yes.

7 CROSS-EXAMINATION

8 BY MR. MCGUIRE:

9 **Q.** Mr. Cobb, are you aware that the EAC certified Democracy  
10 Suite 5.5-A on January 30, 2019?

11 **A.** January? No. I think they certified it -- I'm not aware  
12 of that.

13 **Q.** If I showed you a certificate from the EAC's website,  
14 would that help resolve your uncertainty?

15 **A.** Yes.

16 **Q.** Okay. I will see if we can do that. I would like to pull  
17 up in the meantime PX 54.

18 Now, Mr. Cobb, do you recognize PX 54?

19 **A.** Yes.

20 **Q.** What is that?

21 **A.** That is the test report produced by my company for the  
22 State of Georgia.

23 MR. MCGUIRE: Okay. Your Honor, I would like to move  
24 this into evidence, please.

25 MR. TYSON: Your Honor, we obviously don't have an

1 objection.

2 THE COURT: Admitted.

3 **Q. (BY MR. MCGUIRE)** Thank you. So if you could scroll down  
4 just a little bit, there is a date on that report.

5 Do you see -- Mr. Cobb, do you see the cover page, the  
6 date there, November 26, 2019?

7 **A.** Yes.

8 **Q.** Is that the date when you conducted -- when Pro V&V signed  
9 off on its report?

10 **A.** That is when we issued the report.

11 **Q.** Okay. Now, you told Mr. Tyson that version 5.5-A (GA)  
12 came before version 5.5-A; correct?

13 **A.** There is not a different system. It is just this report  
14 came out before 5.5-A was certified by the Election Assistance  
15 Commission.

16 **Q.** So that would be true -- that wouldn't be true if the EAC  
17 certified 5.5-A in January of 2019, would it?

18 **A.** No.

19 **Q.** I would like to go to the second page.

20 THE COURT: I'm sorry. Where is it you are saying --  
21 in January of 2019, what was certified? 5.5? Is that what you  
22 are asking, Mr. McGuire?

23 MR. MCGUIRE: Well, I'm representing to him since he  
24 is not aware that in January of 2019 5.5-A was certified by the  
25 EAC.

1 THE COURT: What is this now that we have in front of  
2 us on the screen?

3 MR. McGUIRE: This is Mr. Cobb's report on 5.5-A  
4 (GA).

5 THE COURT: Okay.

6 THE WITNESS: Correct. I think I can clear this up.  
7 5.5-A was certified by the EAC. Then 5.5-A -- or hold on. We  
8 have got to go back. 5.5 was certified. Then we had to make a  
9 change for Pennsylvania, and it went to 5.5-A. Then 5.5-A had  
10 an ECO that came out in -- I forgot the exact date -- but in  
11 the August time frame. And then we had to go back and do the  
12 Georgia testing over on the new stuff with the new ECO in it.  
13 And that is the report we put out.

14 And then the EAC was still going through their ECO  
15 program. They didn't accept the ECO, I don't think, until  
16 April of 2020. So there is a chronological order to all of  
17 this.

18 **Q. (BY MR. McGUIRE)** Right. So what I'm trying to get at is:  
19 The version that was certified as 5.5-A, which was certified in  
20 January of 2019, was changed to produce 5.5-A (GA); correct?

21 **A.** No. It was changed to produce 5.5-A with an ECO applied  
22 to it. But we had to go back and do this testing for Georgia  
23 because the ECO had changed the system.

24 MR. McGUIRE: Let me turn to Page 4 -- Holly, if you  
25 could pull up Page 4 of this PX 54, please. If there is any

1 way you can widen it. I'm looking at that Section 2.0 testing  
2 overview.

3 **Q. (BY MR. McGUIRE)** Mr. Cobb, if you can see that  
4 Section 2.0 testing overview, that text paragraph there says,  
5 the evaluation of D Suite 5.5-A (GA) was designed to verify  
6 that certain features and applications which have been modified  
7 from the certified baseline system conform to the applicable  
8 EAC VVSG 1.0 requirements.

9 Did I read that correct?

10 **A.** You did.

11 **Q.** Okay. So what you are saying then is that you were  
12 looking at a change in -- when you did this report in November  
13 of 2019 from what had been certified previously but because  
14 your change was later -- because the engineering change order  
15 that you were reviewing and testing was later accepted by the  
16 EAC that therefore this wasn't a change from your original  
17 certified system?

18 **A.** It wasn't changed from the original certified system. It  
19 was listing a new scanner.

20 **Q.** So I guess that is what I'm getting at. It was a change  
21 from the original system; correct?

22 **A.** It added a new scanner.

23 **Q.** Okay. It added a scanner, but it was a change to the  
24 system; right?

25 **A.** Yes.



1 Q. And any change to a certified voting system has to itself  
2 be certified before it can be legally used; right?

3 A. If it is a change that is deemed de minimis, it doesn't  
4 have to be recertified. It remains certified.

5 Q. And you are saying that this change was found to be de  
6 minimis and was approved after you wrote your report?

7 A. No. This change was originally submitted to us in August,  
8 and we rejected it. It then was resubmitted, and we had to do  
9 hardware testing on the new scanner to make sure that it would  
10 pass temperature power variation tests.

11 Q. Then when you issued this report, the system passed?

12 A. We submitted it to the EAC, and the EAC approved the ECO.

13 Q. Okay. Do you know when that happened?

14 A. It was submitted on April -- April 8, 2020, and approved  
15 on April 13, 2020.

16 Q. So when you were using this -- when Georgia was using this  
17 system before April -- well, I guess that is the question. Was  
18 Georgia using this system before the EAC approved the change in  
19 April?

20 MR. TYSON: Your Honor, I object. I don't know that  
21 there is foundation for Mr. Cobb's knowledge of what Georgia  
22 was using when. We went over this with Dr. Coomer. Mr. Cobb  
23 explained this in his declaration of the timing here. I don't  
24 understand why we are still on this system EAC certified.

25 MR. McGUIRE: Your Honor, the reason we are on it, if

1 I may respond, is because the State's biggest defense of this  
2 system is that it has been thoroughly tested and certified. So  
3 it is worth exploring if that is actually true.

4 MR. TYSON: Everyone says it is. I don't understand  
5 why we are going down the line of questioning.

6 THE COURT: Well, frankly, let me just say, I  
7 certainly didn't understand all of the wrinkles, Mr. Tyson.  
8 But at the same time, Mr. McGuire, it was -- we ended up having  
9 some trial runs that the State ran in the fall of 2019 with the  
10 equipment. And I guess some people voted early in February --  
11 I think we can take note of that -- in the presidential primary  
12 and then the entire election got moved until June.

13 So I think that the sequence of elections is clear.  
14 It is not something that Mr. Cobb necessarily has any knowledge  
15 about. And I understand that -- but just for purposes of all  
16 our just framing this, which I'm sure the State knows this  
17 inside out.

18 MR. TYSON: Yes, Your Honor. And I guess the thing  
19 I'm confused about is it is about one scanner. So we don't  
20 have any testimony that any non-EAC approved scanner was being  
21 used at any point. Again, I'm mystified. We are using an EAC  
22 approved system. The only change is one scanner.

23 THE COURT: Well, I don't know what you were using in  
24 the fall. You know, I don't know when it was swapped out or  
25 anything else like that. So I allowed him to pursue this, and

1 we're going to be able to again.

2 But I'm not sure that knowledge that Mr. Cobb has  
3 about what was used or not is useful at this point. But  
4 understanding the sequence of what he tested and what was  
5 rejected certainly is of relevance. So -- but I would ask  
6 Mr. McGuire to bring this to a conclusion.

7 MR. MCGUIRE: I will. I will wrap it up.

8 **Q. (BY MR. MCGUIRE)** Mr. Cobb, the reason why we test any  
9 changes is because any change to a certified system introduces  
10 the possibility of a vulnerability that is new; right?

11 **A.** Or defect.

12 **Q.** And so that is why we have testing every time there is a  
13 modification of software or hardware?

14 **A.** Correct.

15 **Q.** Okay. Pro V&V paid for this study -- or Pro V&V was paid  
16 by Dominion for this study; correct?

17 **A.** No. I think we were paid by Georgia. I would have to  
18 double-check that.

19 **Q.** Do you view Georgia as your customer, or do you view the  
20 voting system company as your customer?

21 **A.** Georgia.

22 MR. MCGUIRE: Okay. Your Honor, we have no further  
23 questions.

24 MR. TYSON: Your Honor, I have one brief follow-up  
25 question.

## REDIRECT EXAMINATION

BY MR. TYSON:

**Q.** Mr. Cobb, Mr. Cross asked you about altering the digital signature that you had (electronic interference) that you conducted on Version 5.5. Do you recall that testimony?

**A.** Not really. But --

**Q.** Mr. Cross is asking you about the detection of a digital signature being altered, and you had -- had you tested that version 5.5? If you don't recall, that is fine.

**A.** Personally I have not. Back to -- I have security experts on staff. Currently I have a certified ethical hacker. They do the security testing. I don't have credentials to get away with doing security testing.

**Q.** And your certified ethical hacker on your staff right now, who is that and what are their qualifications?

**A.** His name is Mancy Hammond, and that is a certificate. I mean, that is a professional certification that he is a certified ethical hacker.

MR. TYSON: I don't have any further questions then, Your Honor. Thank you.

MR. CROSS: Your Honor, I guess a question.

Mr. Tyson just asked him about the very thing that he said I was not allowed to ask him about. So can I now ask him?

I mean, what I was asking him was about the ability to alter what he says is a digital signature QR code. And

1 Mr. Tyson said I'm not allowed to ask him about what we know  
2 about that.

3 MR. TYSON: No, Your Honor.

4 MR. CROSS: It is really unfair for Mr. Tyson to ask  
5 a follow-up question suggesting that that is not possible when  
6 we know a particular reality. So I should be able to ask my  
7 follow-up question having opened the door.

8 THE COURT: Well, the only thing is --

9 MR. TYSON: Your Honor --

10 THE COURT: -- Mr. Cobb has indicated he does not  
11 have any expertise in the security area so -- and that he  
12 basically delegates it to somebody else on staff, which is a  
13 changing person from what I can tell.

14 So I mean, I don't know that I could give weight  
15 to -- I mean, I don't -- his answer to Mr. Tyson or to anyone  
16 at this point as to security issues if that is what you are  
17 asking about.

18 Is there something --

19 MR. CROSS: I was just going -- I wanted to know if  
20 he is aware of what has been done and how that affects his  
21 conclusions. But --

22 THE COURT: Well, I think he's not an expert on  
23 security issues, and he has indicated he is not doing  
24 penetration testing. So I really feel like this is rhetorical.

25 MR. CROSS: I understand. Thank you, Your Honor.

1 THE COURT: I'm just trying -- what I'm trying to  
2 understand, frankly, is did -- Ms. Santos left in November of  
3 2018. And I'm just trying to -- was she immediately -- and she  
4 was the one who did the security testing or penetration  
5 testing?

6 THE WITNESS: She did penetration testing for the  
7 Common Wealth of Pennsylvania.

8 THE COURT: Okay. That was on 5.5?

9 THE WITNESS: A.

10 THE COURT: A?

11 THE WITNESS: Yeah.

12 THE COURT: That had to be recertified.

13 THE WITNESS: Correct. Their expert was SLI  
14 Compliance. The Common Wealth of Pennsylvania uses them. So  
15 Dominion chose to take 5.5-A to them for the EAC stuff because  
16 they could knock out both the Common Wealth of Pennsylvania and  
17 the EAC all at one time.

18 THE COURT: And they did that before Ms. Santos left  
19 in November of 2018?

20 THE WITNESS: Yes. They went to SLI Compliance  
21 before that.

22 THE COURT: All right. I don't have the documents in  
23 front of me. But that is about the certification. That is  
24 about the sequences. That is helpful.

25 All right. Is this witness excused?

1 MR. CROSS: Yes, for us, Your Honor.

2 MR. McGUIRE: For us as well.

3 THE COURT: Sir, you are excused. Thank you very  
4 much for your testimony.

5 MR. MILLER: Your Honor, can you hear me okay?

6 THE COURT: Yes.

7 MR. MILLER: I believe our next witness will be  
8 Dr. Ben Adida. I believe he is on the chat. There he is. I  
9 believe Dr. Adida is on mute.

10 THE WITNESS: I have been unmuted.

11 MR. MILLER: Your Honor, are you ready for me to  
12 proceed?

13 THE COURT: Yes.

14 MR. MILLER: Would Your Honor prefer to swear in the  
15 witness?

16 THE COURT: I will. I'm sorry. I'm looking at a  
17 document at the same time. And that was unfortunate.

18 Good afternoon. Raise your right hand.

19 **(Witness sworn)**

20 THE COURT: All right. And state your name and your  
21 location.

22 THE WITNESS: My name is Ben Adida, and I am located  
23 in Redwood City, California.

24 Whereupon,

25 BENJAMIN ADIDA, PH.D.,

1 after having been first duly sworn, testified as follows:

2 DIRECT EXAMINATION

3 BY MR. MILLER:

4 **Q.** Dr. Adida, thank you for joining us this afternoon. First  
5 of all, I have got to say congratulations on your recent  
6 recognition with Wired magazine yesterday.

7 MR. MILLER: If I could ask Ms. Cole to pull up what  
8 was submitted as State Defendants' Exhibit 5 and filed at  
9 Docket 889-1.

10 THE WITNESS: Yes.

11 MR. MILLER: Thank you, Ms. Cole. Could you scroll  
12 to Page 13 of that document.

13 **Q. (BY MR. MILLER)** Dr. Adida, have you seen this before?

14 **A.** I have, yes.

15 **Q.** And do you recognize this to be the Wired article?

16 **A.** I have, yes. It has been sent to me by my parents. They  
17 like it too.

18 **Q.** I'm sure they are quite proud.

19 And, Dr. Adida, I'm going to show you just a couple of  
20 other additional exhibits regarding your background.

21 MR. MILLER: Ms. Cole, would you mind pulling up  
22 State Defendants' Exhibit 6 and scrolling to the next page.

23 **Q. (BY MR. MILLER)** Dr. Adida, do you recognize this  
24 document?

25 **A.** Yes. This is my web page.



1 Q. And this is your bio here; is that right?

2 A. Yeah. That is my bio on my web page.

3 MR. MILLER: And, Ms. Cole, if you wouldn't mind  
4 pulling up State Defendants' Hearing Exhibit 7 and if you  
5 wouldn't mind scrolling to the next page.

6 Q. (BY MR. MILLER) Dr. Adida, do you recognize this  
7 document?

8 A. This document looks like a download of my LinkedIn  
9 profile, I think. That is what it looks like, yeah.

10 Q. And is this a true and accurate copy of your LinkedIn  
11 profile?

12 A. Yes. It does look like an accurate representation of my  
13 LinkedIn profile.

14 MR. MILLER: And, Ms. Cole, one last exhibit, Hearing  
15 Exhibit 8 if you don't mind. Thank you. And, Ms. Cole, if you  
16 could scroll to the second page there.

17 Q. (BY MR. MILLER) And, Dr. Adida, do you recognize this  
18 document?

19 A. That looks like one of the pages of my web page that lists  
20 the talks that I have given. Although I apologize that I have  
21 not kept that page up to date. So I have given a number of  
22 talks since 2011 that are not listed here. But that is the  
23 page on my web page.

24 Q. And, of course, as I understand it, you may not have a CV  
25 ready to fire in a quick time period; is that accurate?

1     **A.**     Yeah. I'm lucky enough that I have not had to do a job  
2     search since 2015. And so I have not kept my CV fully up to  
3     date. But I'm happy to proceed to any element that may not be  
4     updated in there, of course.

5             MR. MILLER: And, Your Honor, at this time I would  
6     like to move to admit those Exhibits 5, 6, 7, and 8.

7             THE COURT: Any objection?

8             MR. SPARKS: No objection, Your Honor.

9             THE COURT: They are admitted.

10            THE WITNESS: I want to make sure that you are  
11     hearing me because I'm not seeing the Zoom box come over my  
12     face when I speak. But you are hearing me okay?

13            THE COURT: Fine.

14            I'm just wishing we are in the mountains where you  
15     are shown to be. I don't think you are. But I hope the fires  
16     are not affecting you.

17            THE WITNESS: They are. But we are privileged enough  
18     to be okay. Thank you -- thank you, Your Honor.

19     **Q.     (BY MR. MILLER)** And, Dr. Adida, we just talked about a  
20     handful of those kind of biographical pieces. How about  
21     publications? Have you published any kind of academic articles  
22     or --

23     **A.**     Yeah. I was -- I have a doctorate in computer science  
24     from MIT. And as part of that work and as part of my  
25     postdoctoral work, I have a number of publications in computer

1 science, specifically a number in election security but also  
2 publications in security and privacy of health data and web  
3 security and a handful of other topics that I have had the  
4 privilege of working on.

5 **Q.** And, Dr. Adida, could you describe for the Court your  
6 current employment and work.

7 **A.** Yeah. I am the cofounder and executive director of  
8 VotingWorks. VotingWorks is a nonpartisan nonprofit. We're a  
9 501(c)(3). And our mission is to build trust in elections  
10 through secure, affordable, and transparent voting equipment  
11 and technology.

12 **Q.** And, Dr. Adida, could you -- I know you mentioned  
13 previously your Ph.D. from MIT.

14 And in terms of your other educational background, do you  
15 hold any other degrees?

16 **A.** Sure. I have a bachelor's, master's, and Ph.D. from MIT  
17 in computer science. And I held a postdoctoral fellowship  
18 position at Harvard University also focusing on election  
19 security. Yeah. That would be it.

20 **MR. SPARKS:** Your Honor, I don't mean to interrupt.  
21 But the Curling plaintiffs are willing to stipulate that  
22 Dr. Adida is an expert in computer science in the interest of  
23 time.

24 **THE COURT:** Thank you.

25 **MR. MILLER:** If you don't mind, while we're

1 discussing stipulations, I think to the extent of the expert  
2 testimony here regarding computer science, risk-limiting  
3 audits, and RLA implementation, Mr. Sparks, do you guys have an  
4 objection to those categories?

5 MR. SPARKS: I'm sorry. I need you to separate them  
6 out, Mr. Miller. I couldn't quite hear you.

7 MR. MILLER: Computer science generally,  
8 risk-limiting audits, and risk-limiting audit implementation.

9 MR. SPARKS: I believe we can stipulate to  
10 risk-limiting audit implementation. Curling plaintiffs would  
11 object to risk-limiting audits generally as an area of  
12 expertise.

13 So, again, in the interest of time, we're not willing  
14 to hold up questioning or ask for another set of proffer.

15 MR. MILLER: I guess to that extent, Your Honor, I  
16 would just request some direction from the Court as to the -- I  
17 guess the risk-limiting audit issue that I believe the  
18 plaintiffs aren't ready to stipulate to.

19 I realize we want to move efficiently here. But I  
20 don't want to waste time, but I also don't want to prejudice my  
21 client by moving beyond.

22 THE COURT: Mr. Sparks, you want to identify what  
23 your particular concern is so that we can just zone in on it?

24 MR. SPARKS: Yes, Your Honor. With regard to  
25 risk-limiting audits generally, I understand -- and perhaps

1 this will come out in testimony -- I understand that  
2 VotingWorks uses a software -- I believe it is called Arlo.  
3 And that software is expressly benchmarked against the work of  
4 other experts that are risk-limiting audits, specifically  
5 Dr. Stark. And so without learning more about how exactly that  
6 software would be composed and put together and developed, I  
7 think it is a bit hard to say that in the entire field of  
8 risk-limiting audits in total based on what has been proffered  
9 and what we have seen that we could waive that objection.

10 THE COURT: Why don't we proceed this way since  
11 Mr. Sparks was willing to proceed, Mr. Miller. Why don't you  
12 bear that in mind as you are asking actual questions of  
13 Dr. Adida. And if it needs to be pursued some more at the  
14 conclusion of his examination -- it is going to probably be  
15 taken care of one way or the other. Or if it is not, you can  
16 be given an opportunity to lay a foundation. I would rather  
17 just simply -- it may be addressed in due time during the  
18 course of the examination.

19 MR. MILLER: I understand, Your Honor. And that is  
20 suitable to us.

21 THE COURT: All right.

22 **Q. (BY MR. MILLER)** Dr. Adida, you discussed VotingWorks'  
23 role and kind of the concept of what it is just a minute ago.  
24 Could you tell me a bit more in terms of how you assist  
25 jurisdictions, I believe you referred to it as.

1     **A.**     Broadly speaking, so there are two main things that we do  
2     at VotingWorks. One is we develop voting equipment for voters  
3     to cast ballots and for those ballots to be tabulated. And we  
4     do that so far in a very focused way in only a small number of  
5     jurisdictions around the country.

6             And most of our activity is in helping states and counties  
7     carry out risk-limiting audits, both pilots and actual legally  
8     binding risk-limiting audits.

9     **Q.**     Thank you. And, Dr. Adida, can you describe for us what a  
10    risk-limiting audit is generally as you are referring to?

11    **A.**     Absolutely. I think the right context for this is we have  
12    had over the last 20 years in this country a really very  
13    positive movement towards in some cases (electronic  
14    interference) paper ballots in elections, so ballots that  
15    voters look at, verify, and cast to make sure that their intent  
16    is properly recorded on paper.

17             On the flip side, those ballots -- those paper ballots,  
18    they get scanned by scanners which are computers. And those  
19    computers give the results of the election.

20             And the second most important thing that we can do for  
21    election security after paper ballots is to audit how those  
22    scanners work to make sure that those scanners are properly  
23    tabulating the ballots that they are scanning.

24             And that is exactly the point of the risk-limiting audit  
25    is a kind of audit on the scanners that is very well specified

1 in terms of its physical power and thus can do -- can  
2 effectively limit risk as its name implies if the scanners  
3 declare it the wrong way.

4 **Q.** Okay. And, Dr. Adida, in that context, is RLA applicable  
5 to elections conducted on both BMDs and hand-marked paper  
6 ballots?

7 **A.** So a risk-limiting audit is applicable -- is meant to  
8 audit the process of tabulating paper ballots. So if those  
9 paper ballots can be verified by the voter, then the RLA is  
10 applicable to tabulating those ballots, whether they are  
11 hand-marked or whether they are marked by a machine as long as  
12 the voter does get a chance to handle and verify those ballots.

13 **Q.** And, Dr. Adida, in your experience, do you have an  
14 estimate of how many jurisdictions are intending to conduct  
15 risk-limiting audits in November of this year?

16 **A.** Yes. So risk-limiting audits were invented in late -- the  
17 late 2000s. And -- but Colorado was the only state that  
18 implemented risk-limiting audits other than some small pilots.  
19 And they first did that in 2017.

20 We have been working with a number of jurisdictions around  
21 the country to increase the implementation of RLAs. And we  
22 expect this year in November to see three, four, maybe five  
23 states run statewide RLAs.

24 So it is something that is up and coming. It is extremely  
25 promising for election security. But it is not every state

1 yet. It is just a small number of states of which we're  
2 hoping, of course, Georgia is going to be one of them.

3 **Q.** And I guess to that end, would it be safe to say it is not  
4 the norm in all 50 states at this point?

5 **A.** It is not the norm in practices yet. It is very much the  
6 norm that the overwhelming majority of election security  
7 experts want to see.

8 **Q.** And specific to VotingWorks' work in assisting  
9 jurisdictions with implementing audits, what other  
10 jurisdictions other than Georgia are you working with?

11 **A.** So we have worked with the State of Michigan, the State of  
12 Rhode Island, the State of Pennsylvania -- let me make sure I'm  
13 remembering them all -- the State of Virginia. We've -- I  
14 think I'm forgetting one. But there's -- we have had -- I  
15 think we've worked in the State of Missouri too and the State  
16 of New Jersey.

17 So a number of states that we are working with at  
18 different levels of progress. So some states are very early on  
19 in their exploration. Some states have conducted statewide  
20 legally binding RLAs. So we have various stages. But we're  
21 talking to a number of them, and we're working with a number of  
22 them.

23 **Q.** And you mentioned a point there that kind of leads into my  
24 next question. When you work with those jurisdictions to  
25 implement audits, what does that process entail of implementing



1 an audit?

2 **A.** So what we found through our work in -- working with  
3 states in implementing audits is that process itself of running  
4 the audit, it requires a good amount of training and it  
5 requires a good amount of development of new processes to make  
6 sure that you are doing -- you are managing the paper ballot  
7 custody process, to make sure that you understand that the  
8 local election officials in all of the counties understand the  
9 process for selecting ballots to be audited, retrieving them,  
10 making sure you keep your spot in the right -- in the batch,  
11 entering the data from the ballot, et cetera.

12 So there is a lot of work to do to get everybody up to  
13 speed in running an RLA. And so we have -- our experience is  
14 to start small and to develop that process in a number of  
15 pilots. Our experience is that that is the most promising  
16 approach to getting into a successful statewide risk-limiting  
17 audit.

18 One thing I should mention that is not always clear -- and  
19 I just mentioned counties and the state. An RLA is -- has this  
20 interesting property that the number of ballots that you need  
21 to go find and audit depends on two factors. It depends on how  
22 close the contest is. So if the contest is really tight, then  
23 you are going to need to look at more ballots. If the contest  
24 is -- you know, if the margin of victory is super high, then  
25 you won't need to look at quite as many ballots. So that is

1 one. How tight the margin is is one factor.

2 The other one is how -- what is your -- what is the risk  
3 limit and why. How much confidence do you want? Of course,  
4 the higher the confidence, the more ballots you want to look  
5 at.

6 Interestingly, one factor that it does not depend on --  
7 that the work does not depend on is how many total ballots were  
8 cast in the election. That mostly does not affect the amount  
9 of work done.

10 And the reason I mention the detail is that it is actually  
11 really important to the operation of an RLA. What it means is  
12 really you want -- you want to do the RLA at the state level  
13 because at the state level you are going to do a certain amount  
14 of work that if you try to do it at the county level you would  
15 be replicating that same work for however many counties you  
16 have. So you might as well do it on a lot more ballots because  
17 it is the same amount of work as it is for fewer ballots.

18 However, the paper ballots are stored at a county level or  
19 at the jurisdiction level. So you now need to do a dance to  
20 coordinate the process of knowing where all the ballots are,  
21 sampling which ballots you are going to audit, and then  
22 dispatching those orders to sample the ballots to the various  
23 counties so that they can do the work of going to batch 17 and  
24 finding ballot 32 and retrieving it and entering that data into  
25 the auditing worksheet. And that is the process that needs

1 training and tooling and just, you know, debugging along the  
2 way. That is the software that we produced, Arlo, to help run  
3 that process. And that is the training we provide to states to  
4 help them understand how that process should go.

5 **Q.** Thank you. And so I'm trying to understand kind of  
6 generally you view this as two separate aspects, one being the  
7 software being its own thing and then the second thing the  
8 process around how you get to the point of putting ballots in  
9 the software?

10 **A.** Correct. I would even split it up into three steps. The  
11 first step is like the math, the formulas for Arlo, which have  
12 been determined and written and peer reviewed by folks like  
13 Professor Philip Stark, who is one of the inventors of the math  
14 and the formulas. And then there is the software around that  
15 that is the work flow. How do you dispatch the request to the  
16 county to have them go look at certain batches and certain --  
17 and what not? And then there is the training of the people to  
18 use the software and to apply the work flow.

19 So that is how I would think about it.

20 **THE COURT:** I'm sorry. I didn't hear where you  
21 said -- before you said you really have to look at chain of  
22 custody on ballots. And where does that come in in your three  
23 steps?

24 **THE WITNESS:** How does the chain of custody -- I'm  
25 sorry. I was separating the work in terms of three categories.

1           So the ballot chain of custody training to help make  
2     sure that the process for maintaining where the ballots are, et  
3     cetera, that was in the third piece, Your Honor. The part  
4     where we're training people on how do you manage the ballot  
5     custody -- the ballot custody process.

6           This is -- the really powerful thing about  
7     risk-limiting audits and training counties and states to run  
8     risk-limiting audits is that it helps kind of debug all the  
9     kinks in the system. Right? They feel like, well, I can't  
10    find this batch. All right. Well, we have to do a better job  
11    of figuring out how we label the batches and figuring how we  
12    know where they are stored because the audit is a really good  
13    forcing function for making sure that everything else in the  
14    ballot custody process is running smoothly.

15           Does that answer your question, Your Honor?

16           THE COURT: Well, I just -- I don't really -- you  
17    will walk me through -- you said the second category was  
18    software flow. Then you said the next one was training. But  
19    then you got back to work flow also there.

20           THE WITNESS: Yes. The software -- I understand  
21    where I'm being confusing. The software implements the work  
22    flow between the states and the counties, meaning it manages  
23    the dance of -- maybe I should take a step back and give you a  
24    little bit more of an explanation.

25           THE COURT: We are sort of time-limited. So that is

1 all right. I mean, I will see if it makes a difference. That  
2 is fine.

3 I just was trying to understand since there are  
4 issues that are posed in this case about the actual -- what  
5 ballots actually show as well as the actual functionality of  
6 the software itself for counting the votes, that is what I was  
7 trying to find out where was that in your process.

8 THE WITNESS: Yes.

9 THE COURT: But I think when -- you know, either it  
10 will or will not come out during your examination.

11 THE WITNESS: Okay. I'm happy to answer more  
12 questions.

13 **Q. (BY MR. MILLER)** Dr. Adida, in terms of your involvement  
14 with Georgia's implementation of RLAs and pilots, can you  
15 describe kind of that scope that VotingWorks had?

16 **A.** Yeah. So we started engaging with Georgia in 2019  
17 alongside the organization Verified Voting. That is another  
18 organization that has been working on implementing  
19 risk-limiting audits. And we worked with them in a first  
20 pilot -- we usually go and look for one county -- to debug the  
21 process in one county.

22 I think the first county was -- I hope I'm pronouncing  
23 this correctly -- Bartow County. I don't know if it is Bartow  
24 or Bartow. I hope -- I was not the person on the ground there.

25 But in that county, we did the first pilots in 2019

1 alongside Verified Voting where I believe it was Verified  
2 Voting that was leading the charge on training in that  
3 particular case. And they were using Arlo, the software that  
4 we -- that we produce to run the actual work flow of the audit.

5 There was also -- we have also done a pilot in Fulton  
6 County. And we have done another pilot most recently in Glynn  
7 County. And those are the three pilots to my knowledge that we  
8 have done in Georgia to date.

9 Again, these are small pilots. They are single county.  
10 They are meant to debug the process. They are just, you know,  
11 first steps on the way to an actual statewide risk-limiting  
12 audit.

13 **Q.** Dr. Adida, speaking of that process, could you walk us  
14 through kind of the soup to nuts of preparing for and executing  
15 an audit.

16 **A.** Yeah. So the most important thing is -- you know, the  
17 software that we built is software that is explicitly made to  
18 be used by any state. So that we're working on -- it is the  
19 same software for everybody.

20 When we go into a county, what we need to understand is  
21 how do they store the data about where their ballots are  
22 stored, what we call a ballot manifest. Right? What are the  
23 batches, batch sizes, what are their locations, what are their  
24 numbering, do we have a catalog, do we have that manifest file  
25 that explains -- usually it is a spreadsheet files that says

1 where each batch is located, what it corresponds to. So there  
2 is some training around that and some debugging of that  
3 process.

4 There is also the process of the actual ballot retrieval  
5 itself. So in the first step of the risk-limiting audit, every  
6 county once it is statewide -- every county uploads their  
7 ballot manifests into the software Arlo. And, again, the  
8 ballot manifest -- you can think of it as a simple spreadsheet  
9 that says here are all the batches of ballots I have. Here is  
10 how many is in the batch. And here is where they are located  
11 in case I have to go retrieve that batch.

12 That gets uploaded to the software. The software  
13 aggregates that data. And at the state level, we literally  
14 roll some dice to generate some random numbers. That is done  
15 in the public eye with everybody watching. And then those --  
16 that random number selection is used to do the sampling of the  
17 ballots -- the random sampling. So we don't know ahead of time  
18 which ballots will be sampled.

19 Once those ballots are sampled, the orders are dispatched  
20 back to the counties. So there is an order sent back to each  
21 county that says, I need you to look at batch 32 and give me  
22 ballots 5, 12, and 39, for example. And so those orders are  
23 dispatched to the counties. And the counties at that point to  
24 make things go as fast as possible, they will usually have a  
25 handful of teams working in parallel, what we call audit

1 boards.

2 And each audit board is then tasked with going to get one  
3 or two batches and the ballots from those batches. They have  
4 to bring those ballots back to their table. And together in a  
5 bipartisan way with more than one person from more than one  
6 party looking, they look at that ballot and they interpret  
7 voter intent as it exists on that piece of paper. And this is  
8 really, really important. This is humans interpreting voter  
9 intent. There is no machine involved in this.

10 And that intent is then entered back into the software  
11 which re-aggregates the data at the state level, checks to see  
12 if that data matches the expected result based on what the  
13 claimed winner was. And if it does, then great success is  
14 declared.

15 And if not, if there is something that looks a little bit  
16 off, like, hmm, that margin doesn't look exactly the way it  
17 should based on the physical formulas again of Professor Stark,  
18 then there is a so-called escalation where we say, okay, we  
19 need to do another round, we need to increase the sample size,  
20 maybe we just got unlucky, and maybe we just -- you know, our  
21 sample size unluckily picked ballots that are not  
22 representative of the whole sample. So we need to look at a  
23 few more. Then the process goes on like this until we reach  
24 the risk limit.

25 We designed the Arlo system to try to hit that sweet spot



1 where you a have pretty high chance of completing the process  
2 early because nobody likes to go through a lot of different  
3 rounds of this.

4 But, you know, when you are doing sampling, just like if  
5 you were to do a survey of people, you might get unlucky in  
6 your sample and you find something that is not representative  
7 as a whole. So you might have to do a little bit more work.

8 I'll pause here. I'm happy to answer more questions. I  
9 hope that explains the process.

10 **Q.** I think so, Dr. Adida. You mentioned the Arlo software a  
11 few times. Am I correct in understanding that is an open  
12 source software?

13 **A.** Yes. So Arlo is an open source piece of software that we  
14 have been building for the last year. We are lucky enough to  
15 get assistance from the Department -- financial assistance from  
16 the Department of Homeland Security to build this software.  
17 And it is open source and available to all.

18 **Q.** And, Dr. Adida, are you familiar with the State Election  
19 Board rule in Georgia regarding risk-limiting audits?

20 **A.** I am a little bit familiar with that. I had somebody on  
21 my team who worked with the State on it. And I have seen it,  
22 yes.

23 **Q.** So there's been some discussion here today about auditing  
24 multiple elections or auditing every election throughout the  
25 State.

1           Is that type of concept feasible in your mind?

2   **A.**   Just to be clear, I think you mean every contest in an  
3   election? Is that --

4   **Q.**   Yes.

5   **A.**   So, again, the key thing to understand in terms of the  
6   work required -- well, sorry. Let me back up. What are we  
7   testing for in an RLA? There are two things we're testing for.  
8   We are testing for the possibility that the scanners are  
9   misconfigured and/or otherwise buggy and that they are just not  
10   reading ballots correctly. That is one thing we're trying to  
11   protect against.

12           The other thing we're trying to protect against, to be  
13   clear, is large scale attacks, malicious data attacks, things  
14   that -- malware included on a scanner that could make a scanner  
15   behave perfectly well when it is being tested by the testing  
16   lab and then behave badly on election day.

17           Arlo is meant to control both of those situations. And as  
18   I said before, the work required in an RLA depends on how tight  
19   the margin is and what kind of risk limit we want to reach. If  
20   you wanted to audit every contest on a typical ballot, which is  
21   going to be 15, 20, maybe more contests -- right? -- you may  
22   end up auditing a ballot that is pretty far down the ballot  
23   like, you know, a local position that may happen to be very  
24   tight in terms of its margin and you may explode the amount of  
25   work you are doing honestly for something that is probably not

1 the target of a nation state attack, let's say. So what you  
2 want to do is you want to be judicious in how you apply the  
3 resources you have, the time you have to audit the most  
4 important stuff.

5 So the recommendations we usually give is, of course, you  
6 audit the top contest. If it is a contest -- if it is a race  
7 for president, you are going to audit that. Right? And you  
8 may pick one or two other contests to audit opportunistically.  
9 And that is usually the most efficient way to go about it.  
10 Because, otherwise, if you try to do all of them, you are going  
11 to end up spending so much time and money that you are not  
12 going to be able to certify the elections in any reasonable  
13 amount of time.

14 **Q.** Thank you. And in your opinion, would a sudden change in  
15 the auditing process be fruitful or easy to implement?

16 **A.** You mean in time for this November?

17 **Q.** Sure.

18 **A.** Yes. That would be a disaster. I think it is really --  
19 you know, the power of risk-limiting audits were first  
20 developed and refined and peer reviewed in academic circles.  
21 So the methodology was really, really thought through and  
22 pushed on and questioned. And then there were pilots around  
23 the country that tried to test things out. The methodology was  
24 refined. And Colorado came out. And then every state gets  
25 trained and adapts their processes to it.

1           These things take time to do well. Changing them last  
2 minute can be catastrophic.

3   **Q.**   Dr. Adida, I believe the Court mentioned this earlier and  
4 I'm sure you are aware of just being in the elections and  
5 auditing space of claims by some that BMD ballots cannot be  
6 used as the basis for an audit because they are not verifiable.

7           Are you familiar with the claim I'm talking about?

8   **A.**   I am familiar with the claim, yes.

9   **Q.**   And have you read the paper by Dr. Bernhard and  
10 Dr. Halderman titled Can Voters Detect Malicious Manipulation  
11 of Ballot-Marking Devices?

12   **A.**   I have read it quite closely. I think it is a very  
13 important paper. And I should disclose in case it is not clear  
14 that Dr. Matt Bernhard, who is the source author on that paper,  
15 is as of very recently an employee of VotingWorks. So we are  
16 looking forward to working closely with him.

17   **Q.**   And, Dr. Adida, do you have an opinion on the thrust of  
18 that paper or what that paper stands for per se?

19   **A.**   Absolutely. My interpretation of the paper -- and it is  
20 my understanding that it would be Dr. Matt Bernhard's  
21 interpretation too from my conversations with him -- is that  
22 that paper indicates that -- there are two questions that have  
23 always been asked about -- well, there's more than two -- but  
24 two of the questions that have been asked about ballot-marking  
25 devices is can voters even verify their ballots and the second

1 one is, if they can, do they. Right?

2 And this paper in my mind -- in my interpretation says  
3 yes, voters absolutely can verify their ballots if given the  
4 opportunity and given the proper nudges. Right?

5 There are discussions left to be had. There are  
6 improvements left to be had on how often they actually do. And  
7 I think it is really important to continue to push the science  
8 forward on that and to understand what things we can do to make  
9 sure that a lot of voters actually confirm their ballot.

10 But the very important question that was up in the air for  
11 a while aren't even able -- is this a cognitive task that we  
12 can ask voters to. And the paper answers that in the positive  
13 in my opinion.

14 MR. SPARKS: I believe Mr. Brown asked to be unmuted.  
15 I just wanted to bring that to your attention.

16 MR. MILLER: I'm sorry. Mr. Brown, did you mean to  
17 offer anything?

18 MR. BROWN: No. I was going to make sure -- I was  
19 about to object. But I just wanted to make sure I was unmuted.

20 **Q. (BY MR. MILLER)** And so, Dr. Adida, on the kind of general  
21 debate as to whether a risk-limiting audit is worth anything on  
22 a BMD, do you have an opinion as to that matter?

23 **A.** Absolutely. I think my opinion is that they are  
24 incredibly important. Like a number of other security experts,  
25 I believe that once we have paper ballots, the next most

1 important thing to implement is risk-limiting audits, whether  
2 those ballots are produced by a printer from a computer or  
3 whether they are marked by a human.

4 As long as the voter gets a chance to verify that ballot  
5 on paper, then the RLA is incredibly important. One analogy I  
6 like to use, because some folks will question like, well, did  
7 the voter really check the ballot -- and there are very  
8 worthwhile debates to be had about what can we do to make sure  
9 more voters check their ballots.

10 I like to think of that as we are having a debate over the  
11 quality of the lock on the front door. Right? We have got a  
12 house, and we have got a lock on the front door, which is this  
13 paper ballot. And we are having a debate as to whether this  
14 kind of paper ballot is, you know, the super strength lock or  
15 the medium strength lock.

16 And, meanwhile, the RLA is calling out and saying, hey,  
17 the back porch window is open. Could we, like, close that one  
18 please? Because ultimately nothing right now checks the  
19 tabulation -- without an RLA, no one is checking that the  
20 computer is doing the tabulation or doing their job properly.

21 And this is a problem around the country. Right? So  
22 implementing that RLA and saying, well, at least we're counting  
23 the paper properly is really closing this wide open window that  
24 is so important to close and that I wish many more states were  
25 engaging in.

1        We can continue to debate the quality of the lock on the  
2        front door and how to improve it and how to make it better. I  
3        think that is really important. But we should close the back  
4        window.

5 MR. MILLER: No further questions, Your Honor.

6 MR. SPARKS: Good afternoon, Dr. Adida.

7 THE WITNESS: Oh, hey. How are you? I'm sorry. The  
8 windows moved around.

9 | CROSS-EXAMINATION

10 BY MR. SPARKS:

11 Q. Dr. Adida, my name is Adams Sparks. I'm an attorney for  
12 the Curling plaintiffs in this litigation, and I want to start  
13 by wishing you wishes for health and safety the Court did. I  
14 know the wildfires in California are a terrifying experience.

15     **A.**     Thank you. I appreciate that.

16 Q. So I will ask you a little bit about your views and about  
17 VotingWorks to make sure I understand.

18 THE COURT: Can you hear Mr. Sparks? Because there  
19 is a little bit of an echo.

20 THE WITNESS: Yes, Your Honor.

21 MR. SPARKS: Is it better if I speak up this way?

22 THE COURT: No. That's about the same.

23 MR. SPARKS: I'm sorry. We had a technical glitch in  
24 our main room. So I'm in a different conference room. I'll do  
25 my best to space out my words so it is less troublesome.

1 THE COURT: We know Shannon will interrupt if there  
2 is a problem. Go ahead.

3 **Q. (BY MR. SPARKS)** I apologize. Dr. Adida, you are  
4 assisting Secretaries of State with developing and implementing  
5 risk-limiting audits on a statewide basis? That is right?

6 **A.** In Georgia, yes. We are, yes.

7 **Q.** You assisted with the drafting of the risk-limiting audit  
8 rule that was adopted yesterday by the State Election Board; is  
9 that right?

10 **A.** Sorry. I don't know this information about what was  
11 adopted yesterday. We have -- I assume it is what we have --  
12 we did indeed work -- we made some suggestions to the State  
13 that were based on the statute in Rhode Island. We did indeed  
14 make suggestions to the State of Georgia based on those, yes.

15 **Q.** I'll get to Rhode Island in a moment.

16 Now, surely you are or VotingWorks are being compensated  
17 for your advice to the State; is that correct?

18 **A.** We are being compensated specifically for the training and  
19 operations of risk-limiting audits. I am not being compensated  
20 for this testimony. Yeah. But we are actually being  
21 compensated for assistance in implementation of risk-limiting  
22 audits.

23 **Q.** Yes. And you agree that voters should have a choice to  
24 use hand-marked paper ballots at polls if they want to; isn't  
25 that right?



1     **A.**    I would like that, yes. I think that's -- it would -- I  
2     believe in voter choice, and I like that idea. Yes.

3     **Q.**    And VotingWorks is actually a vendor of barcoded  
4     ballot-marking devices just like Dominion; isn't that right?

5     **A.**    That is one of the things we do, yes. It is not the only  
6     thing. But yes.

7     **Q.**    You also offer software as discussed; right?

8                 COURT REPORTER: I'm sorry?

9     **A.**    I'm sorry? I didn't hear that.

10    **Q.**    **(BY MR. SPARKS)** I'll try to slow down. Forgive me.

11                You also -- we discussed earlier that you sell auditing  
12    software? I think Arlo is the name. Is that right?

13    **A.**    Right. So to be more specific, we -- we -- the software  
14    is always available free. What we provide is support,  
15    training, and hosting for it. But the software itself is free  
16    and open source and funded by the Department of Homeland  
17    Security.

18    **Q.**    And it is also your view that with respect to voting  
19    systems the most secure systems tend to be the ones that have  
20    received intense public vetting; isn't that correct?

21    **A.**    I don't know where you are pulling that quote. But in  
22    general, I agree with the spirit of that, yes.

23    **Q.**    You have also testified that deploying risk-limiting  
24    audits is quite a challenge and endeavor; correct?

25    **A.**    Yes, I have. Yes.

1 Q. All right. And, in fact, Georgia intends to perform just  
2 one risk-limiting audit of a contested statewide race in 2020;  
3 correct?

4 A. I don't actually know what the exact plans are. But  
5 certainly it would -- that would be a pretty reasonable first  
6 step in my opinion for a statewide risk-limiting audit.

7 Q. That was part of the proposed rule that you helped to  
8 draft?

9 MR. MILLER: Objection, Your Honor, for  
10 characterizing the proposed rule as a legal matter and what it  
11 says. I think we can at minimum have the rule up.

12 But also I think Dr. Adida has already said he didn't  
13 do the actual scrivener's work of drafting the contents.

14 MR. SPARKS: I'm just referring to the document in  
15 his declaration, Paragraph 11.

16 THE COURT: What paragraph are you referring to?

17 MR. SPARKS: I'm sorry. I was going off of  
18 Paragraph 11 of Dr. Adida's declaration, 834-2 in the record.

19 Q. (BY MR. SPARKS) Dr. Adida --

20 THE COURT: Dr. Adida, did you, in fact, assist in  
21 providing -- draft of the Election Board -- State Election  
22 Board rule?

23 THE WITNESS: Absolutely, yeah. I'm pulling it up  
24 now. Yes, we have. I have reviewed it at a high level. I'm  
25 not the individual who worked on that. That was our Monica

1 Childers, who is one of the world's experts in implementing  
2 RLAs. But yes, that is right.

3 So I certainly know that our recommendation in  
4 general is to start with a small number of contests. It was  
5 not in my mind as to exactly whether we recommended one or two  
6 or an exact small number.

7 I apologize for not making that clear.

8 MR. MILLER: Well, Your Honor, I will point out while  
9 the declaration is up in Paragraph 11 it begins there  
10 VotingWorks has assisted the Secretary of State's office and  
11 then goes on to say that included. In other words, the point  
12 being VotingWorks rather than Dr. Adida personally.

13 THE COURT: All right. Well, I really didn't care.  
14 It was a question of the organization run that he is testifying  
15 on behalf of and obviously has a role in. But that is fine.

16 MR. SPARKS: Terrific.

17 **Q. (BY MR. SPARKS)** Dr. Adida, in your own words, without a  
18 risk-limiting audit, we are effectively trusting computerized  
19 scanners to count our paper ballots?

20 **A.** That is correct. Exactly right. Except if you do a full  
21 hand count. But yes. Other than those two situations, yes, we  
22 are trusting the scanners.

23 **Q.** And in speaking -- I know you mentioned Rhode Island  
24 earlier and that the Rhode Island statute was the basis for the  
25 rule that we just discussed.

1 Is that accurate?

2 **A.** It was what we suggested as a model to the State of  
3 Georgia.

4 **Q.** Okay. And are you aware that Rhode Island uses  
5 hand-marked paper ballots and a ballot-marking device per  
6 precinct for accessibility reasons, just like our clients are  
7 seeking in this case here?

8 **A.** I did not have that off the top of my head, but I  
9 certainly believe it.

10 **Q.** And VotingWorks has never assisted with a statewide RLA in  
11 a state that uses only ballot-marking devices at the polls for  
12 non-provisional ballots; isn't that correct?

13 **A.** We -- so I want to make sure that I restate this in case  
14 it wasn't clear. If the paper ballots have a chance to be  
15 verified by the voter, they can be used in an RLA whether they  
16 were BMD-produced or hand-marked produced.

17 So we are not going around to the states we are talking to  
18 and double-checking which kind of voting system they used, as  
19 long as it is -- the voter can verify it.

20 I believe there are some areas in Pennsylvania that use  
21 all BMDs. I could be mistaken. I'm saying this off the top of  
22 my head. But we have worked in the State of Pennsylvania where  
23 that is the case. We have worked in states where there are  
24 BMDs. We have worked in states where there are hand-marked  
25 paper ballots. Both.

1 Q. Thank you, Doctor. I understand where VotingWorks has  
2 worked. I just wanted to make sure that I hadn't misunderstood  
3 the states where you worked and whether any of them used BMDs  
4 on a statewide basis on election day. And I believe I  
5 understand now. So thank you.

6 A. Okay.

7 THE COURT: The answer was after all that yes or no?

8 THE WITNESS: So my -- to the best of my knowledge,  
9 Georgia is the only state so far that we have worked that is  
10 all BMDs. But I have not done the -- yeah -- to the best of my  
11 knowledge, yes.

12 Q. (BY MR. SPARKS) Dr. Adida, you have no reason to dispute  
13 the idea that Georgia does not presently plan to do more than  
14 one statewide audit in one contested race every two years as  
15 currently planned; is that correct?

16 A. I don't know enough about the details of those plans  
17 really to comment on that question.

18 MR. SPARKS: Your Honor, I don't have any further  
19 questions at this time.

20 MR. MILLER: Your Honor, I do have just one or two  
21 quick questions.

22 THE COURT: I'm sorry, Mr. Miller. Just one second.  
23 I want to make sure that there were no other questions from  
24 other counsel.

25 MR. MILLER: Right. That is what I was asking.

1 MR. BROWN: Dr. Adida, I just have one question. It  
2 may go to two or three, but it is just on one topic.

3 CROSS-EXAMINATION

4 BY MR. BROWN:

5 Q. To go back to your metaphor of the back door and the front  
6 door, it is essential for voting that both locks be good;  
7 correct? Front and back?

8 A. What I would say is that elections are an extremely  
9 complex system. And there are many, many doors and windows.  
10 And it is essential to make sure that we strengthen all of  
11 them.

12 They are not closed or opened. They have different  
13 strengths. And the gaping one right now is tabulation. And,  
14 of course, we should continue to improve every other aspect.

15 Q. You understand that -- you understand this lawsuit is not  
16 about tabulation auditing and that whether there are  
17 hand-marked paper ballots or BMD ballots everyone agrees that  
18 the tabulation auditing needs to be as best as it can? Do you  
19 understand that?

20 A. Yeah. I'm not -- I have not reviewed all of the details  
21 of the lawsuit. I can simply say I'm called to testify on the  
22 specifics of the RLAs, which I think Georgia is following good  
23 practices on deploying. But I can't comment on all the rest,  
24 of course.

25 Q. If you backed up just a second, one question, just in the

1 logic of the auditing, is the BMD -- the product of the BMD is  
2 in the accurate recapture of the voter's choices? Are you with  
3 me? That is the first one question. And then the second  
4 question is whether the tabulator counts what the BMD has said  
5 about the voters correctly; right?

6 MR. MILLER: Your Honor, I believe counsel literally  
7 proposed a compounded question there.

8 THE COURT: All right. Then restate it, Mr. Brown.

9 **Q. (BY MR. BROWN)** It is a two-part process. The first  
10 process would be determining whether what the BMD says about  
11 the voter's choices collectively is correct and the second part  
12 is determining whether the tabulators count all of that  
13 correctly.

14 Do you follow me?

15 **A.** I don't quite agree with how you framed the first part. I  
16 can -- I want to be very, very clear that the voter verifying  
17 that paper ballot -- and we obfuscate that quite a bit. Right?  
18 There is a paper ballot that the voter is looking at. It is  
19 that act of verification that is critical. It is not -- we are  
20 not trusting the BMD to just do its job. There is an act --

21 **(Unintelligible cross-talk)**

22 MR. BROWN: That is what I'm getting at.

23 THE COURT: All right.

24 MR. MILLER: I'm sorry. If the witness could --

25 MR. BROWN: Do you have an objection? Is that an

1 objection? Don't just --

2 THE COURT: All right. Mr. Miller, let Mr. Brown  
3 finish. Just ask the question and be sure not to do a compound  
4 follow-up.

5 **Q. (BY MR. BROWN)** Dr. Adida, your analysis depends upon your  
6 assumption that a sufficient number of voters check their  
7 ballot correctly; right?

8 **A.** I don't know what analysis you are talking about. I'm  
9 saying that the process -- yeah. I would love for  
10 clarification. Tell me more about what you are asking.

11 **Q.** What you are saying is that your RLA that you would do for  
12 Georgia will be effective in determining whether the correct  
13 outcome was achieved so long as you assume that the BMD has  
14 accurately captured the voter's choices; correct?

15 **A.** I think this kind of framing is -- is oversimplistic.  
16 There is no single auditing act that can tell you that  
17 everything went well in an election. For example, I can't  
18 figure out if everybody at the precinct was allowed to vote  
19 properly given the same chance, the same amount of time.

20 Like, there's lots of things that have to be checked in an  
21 election. So the RLA -- I want to be very specific. The point  
22 of an RLA is to check the tabulation of the votes matches what  
23 the voters saw on the paper ballot. That is the only role.

24 And attempts to try to enlarge that role I think are  
25 misguided because you can't get that out of any audit. There's



1 lots and lots of different things you have to check.

2 **Q.** Right. And what you mean in Georgia it is not so much  
3 what the voters saw on the paper ballot but what the BMD  
4 printed on the paper ballot?

5 **A.** No, I don't agree with that. I think that there is --  
6 there is evidence that voters can check. There is evidence  
7 that voters are capable of checking. And I think there are  
8 sometimes attempts to assume that voters are not looking at the  
9 paper ballot. And I don't think the evidence holds up to that  
10 in my expertise.

11 THE COURT: Dr. Adida, I'm not saying that you are  
12 wrong, right, whatever else. But I am trying to say when there  
13 is evidence -- we have had very few elections. So I'm trying  
14 to understand what is the evidence that you are relying on.

15 THE WITNESS: Of course. Of course. I'm sorry that  
16 I wasn't clear about that. The evidence that I'm talking about  
17 is the research that I have read that was already mentioned in  
18 this on the paper that -- by Dr. Bernhard and Dr. Halderman  
19 that giving the right nudges voters are able to check their  
20 ballots. That is what I was referring to.

21 Sorry for not being clear.

22 THE COURT: Are you citing to something in Georgia?  
23 I mean, that is what I'm trying --

24 THE WITNESS: No. I'm sorry. I'm not citing any  
25 particular things in Georgia. Sorry for not being clear.

1 THE COURT: Okay.

2 MR. BROWN: That is all I have, Your Honor.

3 THE COURT: Go ahead, Mr. Miller.

4 MR. MILLER: I think actually my questions were  
5 answered there. That is all I have.

6 THE COURT: I had a question.

7 EXAMINATION

8 BY THE COURT:

9 Q. I think you have focused on -- in response to Mr. Brown's  
10 and Mr. Sparks' questions to basically that you are -- your  
11 focus is still that because the voter in your view has an  
12 ability to review the ballot that that basically brings back  
13 part of the equation to a conclusion and you are looking at  
14 does the -- do the numbers as tabulated correspond to the  
15 ballot.

16 You don't have any information about what might happen  
17 when the ballot goes in though. I mean, you are assuming that  
18 the ballot at this juncture -- and maybe not. That is what I'm  
19 trying to understand -- that this ballot is what is going to  
20 control and do you -- is that right?

21 A. I apologize. You cut out right at the beginning of that  
22 formulation, and I didn't hear it.

23 Q. Part of the contention in this case, which you may know  
24 and I assumed as a highly learned person you do know, is that  
25 the -- that there can be malware involved here that

1 basically -- which is the bane of modern technology's  
2 existence, but it makes different forms, and that the data can  
3 be changed.

4 And so there are two ways in which that can manifest  
5 itself. One is -- if one is really concerned about the  
6 results. One can be -- it can be a change in the ballot that  
7 you posit that the individual got to correct even though it may  
8 have 50 or 60 slots for them to have looked at and checked.

9 The second one is simply that the vote -- that the actual  
10 results are changed even though they may look at it and it may  
11 look a certain way but, in fact, it is -- in the scanner that  
12 it simply counts in a different way.

13 **A.** That's correct. Yes.

14 **Q.** Or that it might even remove some of their votes.

15 **A.** What were the last words? Something about their votes?

16 **Q.** It might remove some votes.

17 **A.** Remove the votes. Yeah, you are worried about the scanner  
18 doing all sorts of things.

19 **Q.** There's many different ways in which the scanner or the  
20 printer could alter things --

21 **A.** Right.

22 **Q.** -- theoretically.

23 **A.** Yeah.

24 **Q.** So -- but your assumption is -- I'm just trying to figure  
25 out: Where are you looking at the tabulation? Are you

1 comparing the ballots to the total? I don't really understand  
2 what you are --

3 **A.** I understand your question. Thank you.

4 **Q.** Tell me (electronic interference) places here that are at  
5 issue -- are at issue in this case.

6 **A.** I completely understand. So specifically what we are  
7 doing in our work with Georgia in the risk-limiting audit is we  
8 are looking at the process that takes a stack of ballots --  
9 right? -- the stack of ballots produced by whether they were  
10 hand-marked or whether they were produced by a machine -- we  
11 take the stack of ballots. They go through the tabulator. And  
12 I want to highlight again that it is -- it is a --

13 Sorry. I don't know why my watch is buzzing.

14 There is a stack of paper ballots that are about to go  
15 through a scanner, that go through a scanner, and then the  
16 scanner tells you the results.

17 The point of an RLA is to make sure that bugs,  
18 malfunctions, dust on the scanner, nation state attacks do not  
19 corrupt that function. That is the main function of the RLA.  
20 That is the most important function of the RLA.

21 And that is the work that we're doing specifically with  
22 the State of Georgia. You mentioned -- one thing you had  
23 stated, you know, is the assumption that the voter looks at all  
24 the contests even if there are 50 of them. One thing I think  
25 is useful to talk about when you are thinking about it is the

1 kind of attacks we are defending against.

2 Well, we are defending against malware, as you mentioned,  
3 which you are right, is the bane of existence in anything that  
4 is computerized. When you are defending against malware, you  
5 look at where an attacker is likely to attack. Right? And  
6 they are likely to attack and use malware which to attack the  
7 race for president or for senator, you know, the top contests.  
8 Right?

9 So that is why -- one, that is why I generally have  
10 optimism that voters will and can check that because those are  
11 the contests they are going to really be looking at. And it is  
12 also why we, of course, recommend that those be the -- and this  
13 is kind of obvious -- that those be the races that get audited  
14 first in the risk-limiting audit.

15 I hope that answers your question. But I'm happy to  
16 answer more.

17 **Q.** Well, I guess I'm not -- I'm not really sure. You are --  
18 you are saying -- what are you doing is you get the ballots and  
19 you run them again or you physically calculate?

20 **A.** Got it. So we do not run them again. In the normal  
21 process of tabulation before we get involved at all, the  
22 ballots go through the scanner and the scanner provides the  
23 results.

24 The process of the RLA in terms of tabulation is entirely  
25 human-based. In other words, people that work with the county

1 on the audit board go fetch the ballots and they look at them.  
2 Actually, the really important part of that that was part of my  
3 written testimony that I'll reemphasize is that QR code doesn't  
4 matter at this point. The only thing that the humans are  
5 looking at when they pull out that ballot is the text that the  
6 voters looked at on the piece of paper. That is what they are  
7 looking at. And that is what they are recording as part of the  
8 audit process.

9 And so the software in the case of -- in the auditing  
10 portion is only used for aggregating the results in a way that  
11 can be verified by all public observers. Because the other  
12 thing is that all of the data from an audit should be public  
13 for folks to review.

14 So the scanner tabulation happens only during the normal  
15 tabulation of the election. And the RLA bypasses that, does  
16 not go back through the scanner. It is human tabulation of a  
17 subset of ballots that is statistically representative of the  
18 whole, and that is what we do.

19 **Q.** I'm sorry.

20 **A.** This can be confusing.

21 **Q.** I understand the assumptions that are built into what you  
22 are doing. But I just don't understand the process completely.  
23 So -- all right. You now have -- you have stripped the  
24 ballots, which were stripped. They are not like --

25 **A.** Yeah.

1 Q. They are more like a grocery printout?

2 A. Yes.

3 Q. And then you are -- so you are counting those up again,  
4 and then you are identifying the numbers that you have and you  
5 are running those numbers -- seeing the ways those were  
6 recorded in the system?

7 A. So that's an excellent question. So the part I didn't get  
8 to earlier is there are different types of risk-limiting  
9 audits. There are different flavors of it. I'll give you the  
10 high level. And then I'll dig into as much detail as you need.

11 Q. Just tell me what you are doing in this -- what the State  
12 is planning to do here. I have about two and a half more hours  
13 of testimony. So --

14 A. I apologize. I'm sorry.

15 Q. It is quite all right. I'm just trying to know what you  
16 were planning to do and whether you are also going to be  
17 looking at the original -- for the hand ballots the original  
18 physical ballot, not a digital copy of it.

19 A. Got it. Okay. So what we are doing in the State of  
20 Georgia is a flavor of risk-limiting audits called ballot  
21 pulling. And the flavor depends on what you can do based on  
22 the configuration of the state. I'm happy to tell you more if  
23 you are interested.

24 But the flavor of ballot pulling is one where you pick a  
25 statistically representative sample of the ballots. You count

1 those. And you compare the totals to what you would expect the  
2 distribution of the totals to be. You are not comparing one to  
3 one ballots. That would be what is called a ballot comparison  
4 audit. And I can tell you why that wouldn't be doable in  
5 Georgia.

6 But in a ballot pulling, you are just doing a small tally  
7 of that subset and you are saying -- let me give you an  
8 example. If it was a democratic primary, if it was Sanders  
9 versus Biden; right? Let's say that Biden -- I'll give you  
10 some real data about one state where we audited.

11 Biden won one of the primaries that we audited by  
12 60 percent. It was 80 to 20 for Biden versus Sanders. So you  
13 go and you sample some ballots. You, say, sample 100. It  
14 comes back and it says Biden has 75 and Sanders has 25. Is  
15 that 80/20? Not exactly. But if you plug it into the  
16 statistical formula that Phil Stark designed, it will tell you,  
17 yeah, that is within what you would reasonably expect if you  
18 sampled a hundred so it is good to go. Or no, actually, you  
19 know, you got 55/45 for Biden, Sanders. That seems extremely  
20 unlikely that you would get something so far off from the 80/20  
21 of what was claimed as the total tally. So let's go look at a  
22 few more ballots and make sure that something didn't go weird  
23 in the tabulation.

24 That is a ballot pulling audit where you are looking at  
25 your sample. You are comparing to the full tally. And, again,



1 it is a sample that is tabulated by humans. And if it is  
2 roughly what you expect, then you are good. If it is a little  
3 bit far out, you grow your sample to make sure that you didn't  
4 basically detect a problem.

5 **Q.** Well, then you are measuring again something that already  
6 -- it seems like you got confirmation bias in what you are  
7 talking about.

8 If, in fact, the election is, let's say, 52 to 48, I mean,  
9 I could be -- that could be very close. You could have a  
10 larger number. But you have got to again -- if you are  
11 thinking about am I going to do this, you have got to have  
12 representatives of -- in a state that has a vast variety of  
13 voters, you have got to be sure that you have actually got  
14 representatives and pull if you are not actually doing a one  
15 for one. I just never understood that you were not doing any  
16 one for one at all.

17 **A.** Right. So to be very clear, this math that I'm talking  
18 about -- so you put your finger exactly on it. If it is 52/48,  
19 you are going to need a heck of a lot more ballots than a  
20 hundred to get to the high level of confidence that things went  
21 well.

22 But the thing I want to be very, very clear about is that  
23 the formulas we use to figure out how many ballots you sample,  
24 whether you declare victory or not on the audit, these are  
25 formulas that were designed by Professor Philip Stark. These

1 are things that have been peer reviewed by academics. Like,  
2 there is nothing new. And that is probably one of the areas  
3 where everybody would agree, like, the formula is correct.  
4 Like, there is --

5 **Q.** What I'm trying to get at is: I didn't understand,  
6 frankly, when Dr. Stark testified in the beginning that he was  
7 so irritated about -- I'll be just candid. So I think what his  
8 concern -- I'm being told my voice is muffled.

9 **A.** Sometimes it is muffled. But I hear you well enough. So  
10 I can understand you.

11 **Q.** Let me get a little closer. So it appears that his  
12 concern was, in fact -- had to do with just doing one and the  
13 more -- and also the way -- now, I'm going to opine on this  
14 completely. I have to go back and read his testimony about  
15 this.

16 But there seemed to be a whole issue. But I'm going to --  
17 you know, I understand that there is some consensus to some  
18 extent that is in part now fraying at the edges about some of  
19 these issues about how you approach it, what you are doing.

20 But that is -- I'm just trying to understand what you are  
21 doing so that I get it because it is what the State is offering  
22 as a protection here even though there is significant  
23 challenges to the technology and whether both the -- not just  
24 the -- basically the challenge to the way that the votes are  
25 counted that are in the BMDs as well as ones that are being

1 scanned -- the hand ballots.

2 So that is why I had a lot of questions about what you are  
3 actually looking at because there were questions about the --  
4 how the scanning had altered the vote potentially.

5 But the point was really about the large sample. If you  
6 were expecting 52 to 48 -- and I'm just trying to understand  
7 it -- then -- or if you are expecting 55 to 45 percentage, is  
8 that confirmation bias? Because then as long as you get  
9 something that looks like 55 to 45, it is right? What if that  
10 is exactly wrong? It is the flip side.

11 **A.** So the way to think about is it really -- it is a  
12 fantastic question. It is a very insightful question.

13 The way you want to do it -- and there are some details  
14 that you have got to get right to make sure that the statement  
15 I'm making is correct. And that is, you have to have -- there  
16 are things you have to get right. Like the count of the  
17 ballots has to be something that is verified independently of  
18 the voting system. Right?

19 So there are a few details that you want to get right in  
20 the RLA for the following sentence that I'm about to make to be  
21 true. That sentence is: The voting system is claiming 55/45.  
22 Right? You put them through the scanner. And the scanner  
23 tells you 55/45. And you, as the auditor running the RLA, are  
24 saying, okay, that is the claim. I want to verify. I don't  
25 believe it. I want to verify it. I'm going to say is that

1 actually what happened. If it was really 55/45 and if I were  
2 to go sample those ballots, the physical ballots over here, and  
3 go look at them, then I would expect if I pick, you know, say  
4 100 of them, to get maybe or most likely between 53 and 57  
5 provided, like in the primary between Biden and Sanders.

6 You know, you are going to be a little bit off  
7 statistically. But that is what I would expect. If I get  
8 something off of that, then the probabilistic statement that  
9 I'm trying to ask is: If this was really 55/45, how likely is  
10 it that I got 50/50 in my sample? Right? And then the  
11 probability will tell you not very likely. So I smell a rat.  
12 Right? I smell a rat in the claim 55/45.

13 What you are doing is you are comparing the claim of the  
14 voting system, 55/45, against your physical experience sampling  
15 the ballots -- the real ballots that have a chain of custody to  
16 them that were filed and you have all the logs, et cetera, and  
17 you are saying that's the real thing. Let me go check against  
18 the real thing.

19 And in this sample, what I'm getting, is that a believable  
20 outcome based on what the voting system is claiming. So you  
21 are comparing the claim to the real ballots. And if there is a  
22 sufficient mismatch, you smell a rat and you escalate the  
23 audit.

24 **Q.** So if you say the most important race is obviously the  
25 presidential race. But (electronic interference) our system

1 according to regulations of the Secretary of State --

2 COURT REPORTER: I'm sorry, Judge. You are breaking  
3 up. I cannot understand you.

4 **Q. (BY THE COURT)** So if in our new system under the rules  
5 adopted, the Secretary of State has the provision to select one  
6 race every two years for auditing purposes. That is what the  
7 RLA will be. It could be more. But that is what -- that is  
8 the provision right now.

9 Do you understand that?

10 **A.** I do understand what you are saying. Yeah.

11 **Q.** So if you have something like a -- knowing what you know  
12 about Georgia since you have been consulting, what type of  
13 sample would that look like in Georgia for a presidential race?

14 **A.** So that -- so I'm sorry if I didn't make that part clear.  
15 You mean, how many ballots you would be looking at? Is that  
16 what you are saying?

17 **Q.** Yes.

18 **A.** Yes. So that depends entirely on what the claimed margin  
19 of victory is by the voting system. So if the voting system  
20 comes out and says it is a 52/48 race, you plug that into the  
21 Phil Stark formula and it tells you, in that case, you've got a  
22 good sample. So you don't decide the number before the result.  
23 Maybe that is the point I should have made clearer from the  
24 start.

25 Which is: First, you wait for the voting system, the

1 scanner to make a claim. The scanner is claiming that the  
2 results are, you know, 52/48. Then you plug that into the  
3 formula, which is what's implemented in our Arlo software based  
4 on Philip Stark's formulas. And then that tells you, well, in  
5 that case, you've got to go look at 1000 ballots or 2000  
6 ballots or 5000 ballots. And so it is adapted to whatever the  
7 voting system is saying.

8 **Q.** So let's say you are looking at 2000 ballots. What is  
9 your -- I'm just trying to understand this because this is --  
10 you know, we have been talking about auditing in one form or  
11 another for about two years.

12 **A.** Of course.

13 **Q.** In a place as diverse as Georgia, which is what I was  
14 trying to get at before, where we have very different attitudes  
15 in different parts of the state and different political  
16 affiliations and also urban versus rural, is there -- what is  
17 the obligation of the audit to actually in terms of the  
18 population size, the voting population actually do a -- what we  
19 would in other circumstances say a representative sample  
20 geographically, politically, rural, urban --

21 **A.** Yeah. So I'm going to tell you my best understanding of  
22 it and admit that there is a level of statistics that goes a  
23 little bit outside of my expertise. But I will tell you as  
24 much as I know.

25 That is that the formula for an RLA does not assume --

1 does not assume any particular distribution or clustering of  
2 votes. It could be anything. And it is basically doing a  
3 random sample across the set of ballots.

4 So it is valid whether there are clusters of democrats in  
5 this one area and republicans in this one area. The  
6 statistical power of the formula withstands that kind of thing.

7 So it is true to the intent of the entire state or, you  
8 know, if you are looking at a county race the entire county.  
9 But it is true to the overall intent, regardless of how the  
10 population clusters. And exactly how that is done, that is  
11 where my expertise stops and Dr. Stark's begins.

12 THE COURT: All right. Well, I think we have lots of  
13 other things to get to today. I mean, I'm curious. But some  
14 of it may not be -- you know, might not be relevant at this  
15 point or it may be very relevant because the formula may look  
16 good but not be, in fact, (electronic interference) under very  
17 complex geographic and democratic circumstances.

18 So, anyway, I appreciate very much your explanation  
19 and presentation. And I'm sorry I have to cut you off. But we  
20 just have some other witnesses.

21 Is there anything major that counsel feels that they  
22 need to follow up on this, knowing what our time schedule is  
23 and I had to consume some of it?

24 All right. May this witness be excused?

25 MR. MILLER: Yes.

1 MR. SPARKS: Yes.

2 THE COURT: Thank you so very much, Dr. Adida.

3 THE WITNESS: Thank you, Your Honor. Good luck with  
4 the rest of the trial.

5 THE COURT: Thank you. Who is the next -- does  
6 anyone need to use the restroom or do anything else for a  
7 minute?

8 **(There was a brief pause in the proceedings.)**

9 THE COURT: All right. Who is remaining?

10 MR. TYSON: Your Honor, I believe who we have  
11 remaining at this point is Mr. Skoglund, Dr. Halderman, and  
12 Mr. Hamilton. They are the three individuals who have the  
13 testimony under seal or issues that are with the protective  
14 order that are outstanding. So I believe we are at that point  
15 in this hearing.

16 THE COURT: All right. Well, I need to excuse all  
17 members of the public who are not part of the legal team, as  
18 well probably significant parts of the clients. And I think  
19 that I'm going to ask each -- when we are through -- everyone  
20 to leave.

21 And we'll have to take a minute for everyone to sort  
22 of get off who shouldn't be on and then counsel should -- are  
23 responsible themselves for checking whether everyone there is  
24 proper. Anyone in my chambers may stay who are on or anyone  
25 who is affiliated with my chambers. I see Ms. (unintelligible)



1       there. I know Ms. Cole is there someplace. But I don't  
2       know -- I haven't gone and looked at the other pages.

3               So, Ms. Cole, are you able to reach Matt to see  
4       whether there is a different number that we could use to get  
5       on?

6               LAW CLERK COLE: I can create a new meeting.

7               THE COURT: Why don't you create a new meeting then  
8       and circulate it just to counsel and they can --

9               LAW CLERK COLE: I can do that.

10              THE COURT: -- submit people that they want. I am  
11       going to assume that will take a few minutes. It is 4:56.  
12       We'll convene in five minutes then.

13              MR. MCGUIRE: Your Honor, may I ask real quick? Are  
14       you expecting to have closings after this that the public will  
15       be able to attend, or are we going to just do witnesses?

16              THE COURT: I think we're going to just do witnesses.  
17       I think we can't do more. If I need something more that I  
18       think will be helpful, I will ask you to do that in writing.

19              MR. MCGUIRE: Okay. Thank you. All right.

20              THE COURT: All right. So Ms. Cole will generate a  
21       new number. We'll start in five minutes. All right.

22              MR. TYSON: Could I address one issue before we do  
23       that?

24              THE COURT: Yes.

25              MR. TYSON: Mr. Maguire obviously represents

1 Dominion. Would he be appropriate to have in the piece of  
2 Dr. Halderman?

3 MR. McGUIRE: Different Mr. Maguire.

4 MR. TYSON: I'm sorry. Matt Maguire who represents  
5 Dominion.

6 THE COURT: Dominion's counsel?

7 MR. TYSON: Dominion's counsel.

8 MR. CROSS: Your Honor, we would object to that.

9 THE COURT: Why is that?

10 MR. CROSS: He is a third party. I mean, if this is  
11 so confidential that our clients cannot know it and the public  
12 can't know it, I don't understand why a third party would be  
13 allowed to see this.

14 THE COURT: All right. Well, then he -- I understand  
15 the objection. I think it doesn't make full sense but I -- in  
16 the sense that it is about software. But I know that the State  
17 has been very demanding themselves of all of you. So we're  
18 going to just -- I will exclude Mr. Maguire.

19 MR. TYSON: Thank you, Your Honor.

20 MR. CROSS: Thank you.

21 THE COURT: All right. The rest of us will leave,  
22 and we'll return in a few minutes. Thank you.

23 **(These Zoom call proceedings were concluded at**  
24 **4:57 P.M., and the proceedings continued in a**  
25 **private Zoom call, as follows:)**

1 LAW CLERK COLE: [REDACTED]  
2 [REDACTED]  
3 THE COURT: [REDACTED]  
4 [REDACTED]  
5 LAW CLERK COLE: [REDACTED]  
6 [REDACTED]  
7 THE COURT: [REDACTED]  
8 [REDACTED]  
9 MR. RUSSO: [REDACTED]  
10 THE COURT: [REDACTED]  
11 [REDACTED]  
12 MR. RUSSO: [REDACTED]  
13 [REDACTED]  
14 LAW CLERK COLE: [REDACTED]  
15 [REDACTED]  
16 [REDACTED]  
17 [REDACTED]  
18 MR. CROSS: [REDACTED]  
19 THE COURT: [REDACTED]  
20 [REDACTED]  
21 [REDACTED]  
22 MR. CROSS: [REDACTED]  
23 THE COURT: [REDACTED]  
24 LAW CLERK COLE: [REDACTED]  
25 [REDACTED]

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[REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

MR. TYSON: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

MR. TYSON: [REDACTED]

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[REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

MR. BROWN: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

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MR. HAMILTON: [REDACTED]

[REDACTED]

[REDACTED]

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THE COURT: [REDACTED]

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MR. TYSON:

MR. HAMILTON:

MR. CROSS:

MR. HAMILTON:

THE COURT:

MR. CROSS:

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MR. CROSS:

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MR. CROSS:

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THE COURT:

MR. RUSSO:

THE COURT:

MR. CROSS:

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MR. TYSON:

THE COURT:

THE WITNESS:

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MR. TYSON:

THE COURT:

BY MS. ASCARRUNZ:

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**A.** [REDACTED]  
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THE COURT: [REDACTED]  
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THE WITNESS: [REDACTED]  
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THE COURT: [REDACTED]  
**Q. (BY MS. ASCARRUNZ)** [REDACTED]  
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**A.** [REDACTED]  
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**Q.** [REDACTED]

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**A.** [REDACTED]

**Q.** [REDACTED]

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**A.** [REDACTED]

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**Q. (BY MS. ASCARRUNZ)** [REDACTED]

THE COURT: [REDACTED]

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THE WITNESS: [REDACTED]

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THE COURT: [REDACTED]

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THE WITNESS: [REDACTED]

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THE COURT: [REDACTED]

LAW CLERK COLE: [REDACTED]

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THE COURT: [REDACTED]

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**Q. (BY MS. ASCARRUNZ)** [REDACTED]

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**Q.** [REDACTED]

**A.** [REDACTED]

MS. ASCARRUNZ: [REDACTED]

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THE WITNESS: [REDACTED]

**Q. (BY MS. ASCARRUNZ)** [REDACTED]

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**Q.** [REDACTED]

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MR. TYSON:

[REDACTED]

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THE COURT:

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MR. TYSON:

[REDACTED]

[REDACTED]

THE COURT:

[REDACTED]

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MS. ASCARRUNZ:

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THE COURT:

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MS. ASCARRUNZ: [REDACTED]  
[REDACTED]  
THE COURT: [REDACTED]  
MR. TYSON: [REDACTED]  
[REDACTED]  
MS. ASCARRUNZ: [REDACTED]  
[REDACTED]  
THE COURT: [REDACTED]  
MS. ASCARRUNZ: [REDACTED]  
THE COURT: [REDACTED]  
Q. (BY MS. ASCARRUNZ) [REDACTED]  
[REDACTED]  
A. [REDACTED]  
Q. [REDACTED]  
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MS. ASCARRUNZ: [REDACTED]

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MS. ASCARRUNZ: [REDACTED]

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MR. TYSON: [REDACTED]

[REDACTED]

MS. ASCARRUNZ: [REDACTED]

MR. TYSON: [REDACTED]

[REDACTED]

**Q. (BY MS. ASCARRUNZ)** [REDACTED]

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**A.** [REDACTED]

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**Q.** [REDACTED]

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[REDACTED]

**Q.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**A.** [REDACTED]

MR. TYSON: [REDACTED]

[REDACTED]

[REDACTED]

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MS. ASCARRUNZ: [REDACTED]

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[REDACTED]  
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[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]  
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

MR. TYSON:

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

MR. TYSON:

[REDACTED]

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

MR. MAGUIRE:

[REDACTED]

THE COURT:

[REDACTED]

MR. MAGUIRE:

[REDACTED]

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THE COURT:

[REDACTED]

[REDACTED]

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[REDACTED]

MR. MAGUIRE:

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

[REDACTED]

MR. MAGUIRE:

[REDACTED]

[REDACTED]

THE COURT:

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MS. ASCARRUNZ:

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THE COURT:

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**Q.** (BY MS. ASCARRUNZ)

**A.**

**Q.**

**A.**

**Q.**

THE COURT:

MS. ASCARRUNZ:

THE COURT:

**A.**

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[REDACTED]

[REDACTED]

Q. (BY MS. ASCARRUNZ) [REDACTED]

A. [REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. RUSSO: [REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

MS. ASCARRUNZ: [REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

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[REDACTED]

MS. ASCARRUNZ: [REDACTED]

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THE COURT: [REDACTED]

[REDACTED]

MS. ASCARRUNZ: [REDACTED]

MR. McGUIRE: [REDACTED]

THE COURT: [REDACTED]

MR. McGUIRE: [REDACTED]

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MR. RUSSO: [REDACTED]

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THE COURT: [REDACTED]

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MR. McGUIRE: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

THE WITNESS: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MS. ASCARRUNZ: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

MR. TYSON: [REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

MR. MCGUIRE: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

THE WITNESS: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

BY MR. MCGUIRE:

**Q.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



[illegible]

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[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

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MR. McGUIRE:

MR. TYSON:

THE COURT:

MR. McGUIRE:

**Q. (BY MR. McGUIRE)**

**A.**

**Q.**

**A.**

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[REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

[REDACTED]

MR. McGUIRE: [REDACTED]

LAW CLERK COLE: [REDACTED]

MR. McGUIRE: [REDACTED]

[REDACTED]

[REDACTED]

LAW CLERK COLE: [REDACTED]

MR. McGUIRE: [REDACTED]

LAW CLERK COLE: [REDACTED]

[REDACTED]

MR. McGUIRE: [REDACTED]

[REDACTED]

LAW CLERK COLE: [REDACTED]

MR. McGUIRE: [REDACTED]

[REDACTED]

[REDACTED]

**Q. (BY MR. McGUIRE)** [REDACTED]

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[REDACTED]

[REDACTED]

**A.** [REDACTED]

**Q.** [REDACTED]

[REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

**A.** [REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

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[REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

**A.** [REDACTED]

[REDACTED]

**Q.** [REDACTED]

**A.** [REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

MR. McGUIRE: [REDACTED]

[REDACTED]

**Q.** (BY MR. McGUIRE) [REDACTED]

[REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

**Q.** [REDACTED]

**A.** [REDACTED]

[REDACTED]



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[REDACTED]

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[REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

[REDACTED]

[REDACTED]

**A.** [REDACTED]

[REDACTED]

[REDACTED]

**Q.** [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

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[REDACTED]

THE WITNESS: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

THE WITNESS: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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THE COURT: [REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED]

MR. TYSON: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

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MR. TYSON:

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[REDACTED]

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THE COURT:

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[REDACTED]  
MR. MAGUIRE: [REDACTED]  
THE COURT: [REDACTED]  
MR. MAGUIRE: [REDACTED]  
[REDACTED]  
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THE COURT: [REDACTED]  
MR. McGUIRE: [REDACTED]  
[REDACTED]  
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THE COURT: [REDACTED]  
MR. McGUIRE: [REDACTED]  
THE COURT: [REDACTED]  
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MR. TYSON: [REDACTED]  
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THE COURT: [REDACTED]  
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MR. TYSON: [REDACTED]  
THE COURT: [REDACTED]  
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[REDACTED]

[REDACTED]

[REDACTED]

MR. CROSS: [REDACTED]

MR. McGUIRE: [REDACTED]

MR. CROSS: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. SKOGLUND: [REDACTED]

DR. HALDERMAN: [REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

DR. HALDERMAN: [REDACTED]

THE COURT: [REDACTED]

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[REDACTED]

DR. HALDERMAN: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

DR. HALDERMAN: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. SKOGLUND: [REDACTED]

MR. MCGUIRE: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

MR. MCGUIRE: [REDACTED]

[REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

MR. MCGUIRE: [REDACTED]



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MR. BROWN:

MR. CROSS:

MR. MILLER:

THE COURT:

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[REDACTED]

[REDACTED]

MR. BROWN:

[REDACTED]

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

MR. McGUIRE:

[REDACTED]

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

MR. CROSS:

[REDACTED]

[REDACTED]

[REDACTED]

THE COURT:

[REDACTED]

[REDACTED]

[REDACTED]

MR. CROSS:

[REDACTED]

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THE COURT:

MR. CROSS:

THE COURT:

MR. TYSON:

THE COURT:

MR. CROSS:

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[REDACTED]

[REDACTED]

MR. BROWN: [REDACTED]

MR. MILLER: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

MR. MILLER: [REDACTED]

MR. TYSON: [REDACTED]

THE COURT: [REDACTED]

MR. RUSSO: [REDACTED]

[REDACTED]

[REDACTED]

THE COURT: [REDACTED]

MR. CROSS: [REDACTED]

THE COURT: [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

MR. BROWN: [REDACTED]

MR. TYSON: [REDACTED]

[REDACTED]

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THE COURT:

MR. BROWN:

THE COURT:

MR. BROWN:

MR. TYSON:

MR. McGUIRE:

THE COURT:

MR. TYSON:

MR. CROSS:

(The proceedings were thereby concluded at 6:26  
P.M.)

## C E R T I F I C A T E

UNITED STATES OF AMERICA

NORTHERN DISTRICT OF GEORGIA

I, SHANNON R. WELCH, RMR, CRR, Official Court Reporter of the United States District Court, for the Northern District of Georgia, Atlanta Division, do hereby certify that the foregoing 357 pages constitute a true transcript of proceedings had before the said Court, held in the City of Atlanta, Georgia, in the matter therein stated.

In testimony whereof, I hereunto set my hand on this, the 13th day of September, 2020.

*Shannon R. Welch*

SHANNON R. WELCH, RMR, CRR  
OFFICIAL COURT REPORTER  
UNITED STATES DISTRICT COURT

UNITED STATES DISTRICT COURT  
OFFICIAL CERTIFIED TRANSCRIPT